LOWER OROGRANDE
FINAL
ENVIRONMENTAL IMPACT STATEMENT

North Fork Ranger District
Nez Perce - Clearwater National Forests

March 2015

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Nez Perce-Clearwater National Forests
Clearwater County, Idaho

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Abstract: *This Final Environmental Impact Statement (FEIS) is a compilation of the documentation contained in the revised DEIS (October 2012), FEIS (March 2013), and draft Record of Decision (November 2014) that all document the analysis of three alternatives, including a "no action" alternative, that were developed for the Lower Orogrande analysis. The Notice of Intent to prepare the original EIS was published in the Federal Register on December 24, 2009. The Lower Orogrande project proposes watershed improvement, timber harvest, and wildlife habitat enhancement activities within a 21,560-acre analysis area on the North Fork Ranger District of the Nez Perce-Clearwater National Forests.*

A Final Record of Decision will be released 30 days following publication of a Notice of Availabilty of the FEIS in the Federal Register. Since the Objection Process, per 36 CFR 218, has been completed for this project, no further review or comments will be solicited.

Summary

Purpose and Content of this FEIS

Since 2008, the analysis of this project has culminated with two different DEISs and FEISs, and two decisions that were withdrawn to improve the analysis of various wildlife species. The purpose of this FEIS is to compile into one document the contents of these past documents, plus certain information contained in the draft ROD (2014), which recently went through the Objection Process. As such, this FEIS consists of most of the same documentation contained in the Revised DEIS; the Public Involvement section of the previous FEIS, recent reductions in proposed treatment acreage and associated road activities due to field unit layout activities, and an updated lynx analysis. This FEIS also incorporates errata items and instructions gathered from the Objection Panel Review.

As stated, changes to proposed treatment acreage and associated road activities occurred following unit layout activities implemented during the summer and fall of 2013, in which design measures were applied that subtracted from treatment INFISH riparian buffers and areas of high landslide hazard potential. These changes are summarized under each alternative in Chapter 2 and reflected in the effects analyses completed for soils, elk, Canada lynx, vegetation, transportation, and economics. Although these changes would likely reduce the impacts on the remaining resource components, those analyses are still based on the acreage and road miles displayed in the Revised DEIS.

Project Introduction

The Lower Orogrande project, proposed by the North Fork Ranger District of the Nez Perce-Clearwater National Forests, is located entirely within the Orogrande Creek watershed, which contains the Tamarack Creek, Jazz Creek, and Pine Creek sub watersheds as part of the headwaters of the North Fork Clearwater River Subbasin. The 21,560-acre project area consists entirely of National Forest lands within Clearwater County, Idaho.

Existing conditions in area streams show high cobble embeddedness, low pool quality, and insufficient wood in stream areas for fish habitat. Problem system and non-system roads continue to add sediment to area streams, plus there are numerous barriers to the passage of fish and other aquatic organisms.

Due to past management activities, absence of major fires, and insect and disease factors, the current vegetation is fairly homogeneous, dominated by 40-100 year-old grand fir. White pine and other seral tree species currently make up 6% of the total composition. Recent surveys show grand fir beginning to show signs of spreading root disease and other pathogens.

Early and late seral vegetation, needed by various wildlife species, is limited within the area. Although sufficient hiding and thermal cover appear to be present, the availability of security habitat is very low in many parts of the analysis area because of the large number of roads open to motorized use. Desired conditions for this area and a basis for this project are:

- Fish-bearing streams are shaded and cool with low sediment loads, high quality pools, and plenty of woody debris for good fish habitat.
- A diverse and healthy forest covers the landscape.
- A balance of vegetative successional stages provides habitat diversity for wildlife species.
- The number of roads open to motorized use has been reduced, resulting in an increased availability of security habitat.

A. Purpose and Need for Action

1. Watershed Improvement

Purpose: Reduce stream sediment (i.e. reduce road densities and control erosion sources on roads to be retained, especially in RHCAs).

Need: There is a need to reduce sediment input to streams from roads. Excessive instream sediment has the potential to reduce the survival of aquatic species (fish, amphibian, insects). Past area road failures in 1995 and 1996 contributed large amounts of sediment to streams. Sediment levels are currently higher than desired in most area streams. Reducing existing chronic inputs would allow habitat conditions to improve over time.

Purpose: Remove barriers to fish passage and other aquatic organisms to allow for unrestricted access to historic habitats.

Need: There is a need to allow fish and other aquatic organisms access to their historic habitats. Most of the culverts in this area were installed prior to the mid-1990s. They typically were not designed to provide for fish passage or stream simulation (natural substrate on the bottom of the culvert) and have restricted upstream access to historic habitats. This can limit the gene pool above barrier culverts as no genetic interchange from downstream organisms can occur. The focus of replacements are on fish bearing streams as amphibians and insects are less affected by these barriers; both have terrestrial life stages which allows them to move around barriers.

2. Vegetation

Purpose: Restore white pine and larch (regeneration harvest), improve stand vigor (commercial thinning), and start the trend to improve species diversity and balance vegetative successional stages across the landscape to create stand conditions that are resilient and allow for rapid recovery after disturbances.

Need: There is a need to restore tree species composition consistent with making these stands more resilient to change agents, such as insects and disease. Past events of the early 1900s (i.e. large scale industrial timber harvest, white pine blister rust, and to some extent fire suppression) greatly reduced the presence of western white pine and other seral species. With these tree species greatly reduced, the stands reforested naturally to higher percentages of grand fir and Douglas-fir, which are less resilient to disturbance agents, in particular, insects and diseases.

Past events also created a disproportionately large age class of trees that regenerated after disturbance. These approximately 40-100 year old stands are overstocked, where high tree density is responsible for poor health and low growth vigor. This overstocking along with the large presence of grand fir and Douglas-fir, further enhances the loss of resiliency to insect and disease pathogens. If allowed to continue, these conditions will likely lead to a decline in forest health and put future ecological, societal, and economical values at risk.

3. Wildlife

Purpose: Promote a trend in the balance of successional stages toward the historical range and promote a trend towards increased wildlife security.

Need: The current distribution of successional stages shows the early and late seral habitats being under-represented, while mid-seral habitats are over-represented. This condition affects those wildlife species that rely on early and late seral vegetation structure. Foraging habitat is also limited compared to cover habitat. Opportunities exist to achieve a better balance of successional stages.

The availability of security habitat is very low in many parts of the analysis area because of the large number of roads open to summer motorized use. Opportunities exist to close additional roads to motorized summer use and increase the extent of security habitats. Increasing security habitat would increase the effectiveness of these habitats for many species, plus reduce the vulnerability of big game species.

B. Alternatives Including the Proposed Action

A total of five alternatives were considered, with two later being eliminated from detailed study (see Chapter 2, Section IV). The following three alternatives are being considered in detail:

Alternative 1 – No Action

The "no action" alternative means the proposed action would not take place. Although this alternative provides a baseline for comparing the environmental consequences of the other alternatives to the existing condition (36 CFR 1502.14), it is potentially an appropriate management option that could be selected by the Responsible Official.

Alternative 2 – Proposed Action

This alternative responds fully to the project's purpose and need for action through a mix of watershed improvements, vegetative treatments, and wildlife habitat enhancement activities. It is also the "preferred" alternative, as recommended by the project's interdisciplinary team.

Watershed improvements include: (1) decommissioning 16 miles of system roads and 73 miles of non-system roads; (2) replacing 16 undersized culverts; and (3) installing three fish passage culverts.

Vegetation treatments consist of 660 acres of regeneration harvest, 500 acres of commercial thinning, and up to 660 acres of precommercial thinning. Seven of the regeneration harvest units by themselves or in combination with other openings would exceed 40 acres (approved by the Regional Office). Road activities needed for logging access would include approximately 2.4 miles of temporary road construction, 23.6 miles of road reconstruction, and 9.5 miles of road reconditioning.

To improve elk security, approximately 14.5 miles of existing roads would be closed year-round to all vehicles. These roads are located within a large block of security habitat in the Tamarack Creek area.

Alternative 3

This alternative responds the project's purpose and need for action and the public comment asking us to develop an alternative that uses the existing road system. It proposes a mix of watershed improvements, vegetative treatments, and wildlife habitat enhancement activities.

Watershed improvements include: (1) decommissioning 16 miles of system roads and 73 miles of non-system roads; (2) replacing 16 undersized culverts; and (3) installing three fish passage culverts.

Vegetation treatments consist of 600 acres of regeneration harvest, 430 acres of commercial thinning, and up to 660 acres of precommercial thinning. Seven of the regeneration harvest units by themselves or in combination with other openings would exceed 40 acres (approved by the Regional Office). Road activities needed for logging access would include approximately 22.4 miles of road reconstruction, and 9.5 miles of road reconditioning.

To improve elk security, approximately 14.5 miles of existing roads would be closed year-round to all vehicles. These roads are located within a large block of security habitat in the Tamarack Creek area.

C. Affected Environment

1. Soils

The geologic parent material in the project area the area consists of Idaho Batholith granitics (30%), Border Zone metamorphic rocks (25%), Belt Series metasediments (19%), alluvial sediments (11%), and undifferentiated materials (11%), and is overlain by a mixed to intact layer of Mazama volcanic ash ranging from 12 to 24 inches thick. This layer of ash contributes substantially to the water and nutrient holding capacity of the soils and is the significant reason for the high productivity of the soils.

The primary ecological land units used for the Lower Orogrande analysis are landtype associations (LTAs) that are landscape level units that are defined by general topographic landforms, surficial geology, geomorphic processes, soil characteristics, potential natural vegetation communities, and climatic conditions. The analysis area is comprised mostly of low-relief rolling hills, colluvial midslopes, and breaklands.

2. Watershed

The Lower Orogrande area is located within the Orogrande Creek watershed and contains the Tamarack Creek, Jazz Creek, and Pine Creek sub watersheds, as part of the headwaters of the North Fork Clearwater River Subbasin. Stream channels range from relatively steep and confined headwater A type channels to lower gradient B type channels. Orogrande Creek itself is a relatively flat and very wide C type channel.

A primary source of excess sediment is roads, in which cutslope slumping and bare soils can be a chronic source of sediment input to streams. The overall road density for the analysis area is 6.1 mi/mi^2. Watershed condition ratings based on road densities indicate that only the Tamarack and Orogrande-Jazz subwatersheds are in a moderate condition. All others are rated as poor based on road density.

3. Fisheries

Westslope cutthroat, a sensitive species, have the widest distribution of all fish species within analysis area. Low densities of resident rainbow trout are concentrated in Hook Creek, Pine Creek, Fir Creek, and the mainstem of Orogrande Creek. Brook trout, a non-native fish, have been observed in very low densities on the Orogrande mainstem, Cottonwood Creek, and Hook Creek. Bull trout, a threatened species, occur in extremely low densities due to the falls on lower Orogrande Creek. Habitat for bull trout is limited by warm stream temperatures that are not conducive to bull trout survival.

Streams within the Lower Orogrande area can be characterized by high levels of cobble embeddedness, poor to fair pool quality, and high temperatures. State of Idaho Water Quality plans have identified temperature targets for area streams.

4. Wildlife

Wildlife species that could be affected by proposed activities include Canada lynx, elk, northern goshawk, pileated woodpecker, pine marten, fisher, flammulated owl, western (boreal) toad, and wolverine. Though the presence of lynx is very rare or transient, the project area does contain secondary habitat to allow a transient lynx to travel between core areas.

Current elk use is low to negligible and relatively localized. Elk populations on National Forest managed lands are at historic low levels. Both forage availability and quality are declining due to advancing forest succession (trees) crowding out palatable shrubs, grasses and forbs in past timber harvest units.

Goshawks use a variety of forest types, structures, and successional stages, and have been primarily associated with late-successional habitat. Recent (2000-2005) goshawk nesting surveys have been conducted about 30 miles east and northeast in the Lochsa and Upper North Fork Clearwater River drainages, with no goshawks being observed. However, there is suitable habitat available within the Lower Orogrande project area, and data suggest that goshawk nests exist at least some years within proximity of the project area.

Pileated woodpeckers are often associated with late successional forests, but they also use young and fragmented forests with abundant remnant old structure. There is a recent record of a pileated woodpecker observed in the project area, and pileated foraging sign has also been observed in the project area.

Pine martens are members of the weasel family and closely related to fishers. They are widely distributed in northern North America in general and in moderate to high elevation forests in Idaho. The Forest does not have a record of any martens captured or seen in the Lower Orogrande area, but based on proximity and apparently suitable habitat, it seems very likely that pine marten inhabit the project area.

Fishers are associated with diverse coniferous habitat types and successional stages. Fisher habitat remains connected via reforested, mid-seral forest stands and mature-forest riparian habitat conservation areas. There are six documented sightings of the fisher within the analysis area.

Flammulated owls generally nest in relatively large trees in relatively open areas, favoring larger diameter trees habitats with abundant woodpecker cavities. Although there are no records of flammulated owls in the Lower Orogrande analysis area, about 350 acres are currently considered potential flammulated owl habitat.

Western toads use moist areas such as streams, ponds and lakes for breeding, foraging and overwintering habitat. Riparian areas serve as migratory or dispersal corridors. Suitable western toad habitats occur throughout the analysis area, primarily in shallow pools and slow-moving portions of streams. Although there have been no documented sightings of this species within the analysis area, approximately 7,000 acres are considered suitable or potential habitat for western toads.

Wolverines typically inhabit remote mountainous areas above 4500-ft elevations, where human disturbance is unlikely. Although there have been no sightings of wolverine within the Lower Orogrande analysis area, an estimated 600 acres are considered suitable wolverine habitat.

5. Vegetation

Because of the shade intolerance of western white pine, successful fire suppression efforts of the 1900s discouraged the continued reproduction of white pine, as did the introduction of white pine blister rust. This has caused a shift in forest cover types from white pine, western larch, and ponderosa pine to Douglas-fir and grand fir.

Current insect activity noted in Douglas-fir and grand fir includes Douglas-fir beetle, western hemlock looper, and fir engraver beetle. Douglas-fir and grand fir are also both highly susceptible to root disease, which is a common problem in the analysis area.

The distribution of successional stages, also a major component of habitat diversity for wildlife, is outside of historical norms. The mid-seral stage (40-100 years old) dominates 56% of the analysis area, and the early successional stages are under-represented at 14%.

If sequestration of CO_2 is used to calculate the forest's effect on climate change, the analysis area is currently not meeting the mitigation guidelines set forth in the Forest Service Strategic Framework for Responding to Climate Change. Without improvements in ecological health, the future forest could have substantially lower carbon stocks and increased carbon emissions as the result of losses from insects and disease and possible severe wildfire.

Sensitive plant species within the analysis area that could be affected by proposed activities include deerfern, green bug-on-a-stick, constance's bittercress, clustered lady's-slipper, naked rhizomnium, and evergreen kittentail.

6. Transportation and Access Management

The analysis area contains approximately 224 miles of National Forest System Roads, or 6.1 miles of road per square mile. Transportation use throughout the project area is moderate. While there are few developed recreation facilities in the project area, there are trails nearby, including the Clarke Mountain trail system, open to motorized and non-motorized users. In addition, visitors use the existing transportation system to engage in a variety of additional pursuits including hiking, dispersed camping, berry picking, driving for pleasure, hunting and firewood gathering.

7. American Indian Relations

The Lower Orogrande analysis area lies within the 1855 treaty rights boundary and "northern homeland" of the Nez Perce Tribe, and is important to them as an area rich in tribal tradition for gathering, hunting, fishing, camping, and religious activity. Forest Plan direction is to protect Indian tribal rights as retained in treaties and other agreements, and to protect religious ceremonial sites and hunting and fishing rights.

8. Economics

The Lower Orogrande analysis area is located within Clearwater County, Idaho. Local towns and communities influenced by activities taking place in the Orogrande Creek watershed include Orofino, Pierce, Weippe, Kamiah, and Grangeville. Also affected are the larger towns of Lewiston and Clarkston, WA.

The area has a long history of logging. Clearwater Paper in Lewiston is the largest employer in the Lewiston/Clarkston valley and a good share of folks in Clearwater county make the commute to work there every day. Empire Lumber Company in Kamiah with a sawmill in Weippe also, is another major employer in the valley area. Other mills in the area include Blue North in Kamiah, Tri Pro in Orofino, and Idaho Forest Group in Grangeville. Lately the lack of housing starts and the general recession has caused a steep decline in wood production from the local mills.

D. Environmental Consequences

The effects of each alternative in relation to relevant resource issues are displayed in the following table:

Resource Issue	Comparison Summary of Effects
Access Management – The effects of proposed road activities and access restrictions on public access and dispersed camping.	
Alt 1 – No Action	No road activities proposed.
Alt 2	16 miles of system roads decommissioned – eliminates a thru route 73 miles of non-system roads decommissioned Reconstruct Road #547 – mitigates elimination of thru route 14.7 miles of road reconstruction 20.2 miles of road reconditioning 14.5 miles of year-round road restrictions
Alt 3	16 miles of system roads decommissioned – eliminates a thru route 73 miles of non-system roads decommissioned Reconstruct Road #547 – mitigates elimination of thru route 11.6 miles of road reconstruction 20.2 miles of road reconditioning 14.5 miles of year-round road restrictions
Aquatic Habitat – Remove roads within RHCAs and increase fish access.	
Alt 1	Existing Condition: 58 miles of roads within RHCAs Passage for fish and other aquatic species is blocked on 11.5 miles of streams.
Alts 2 and 3	24 miles of roads removed within RHCAs 11.5 miles of access to aquatic habitat restored, with 5 miles being on fish bearing streams.
Climate Change – Effects of proposed activities on climate change and vice versa.	
Alt 1	Inaction to improve forest resilience could result in lower carbon stocks and increased carbon emissions due to losses to insects and disease and possible severe wildfire.
Alts 2 and 3	Each alternative would take steps to improve forest resilience, which in the long-term would improve the carbon sequestering ability of the treated areas.

Resource Issue	Comparison Summary of Effects
Economic Feasibility – Provide for a cost efficient timber sale and funding to complete non-timber sale activities.	
Alt 1 – No Action	na
Alt 2	Appraised value = $612,303. This represents a positive sale offering that could complete a portion of the non-timber sale activities.
Alt 3	Appraised value = $29,202. This represents a positive sale offering that could complete a smaller portion (compared to Alt. 2) of the non-timber sale activities.
Threatened, MIS, and Sensitive Species of Wildlife – Certain species of wildlife could be affected by proposed management activities.	
Alt 1 – No Action	Existing conditions: **Canada Lynx:** Modeled lynx habitat within the project area = 2,694 acres. **Elk Summer Range:** Elk habitat effectiveness = 48%; Forage habitat = 7%; and Standard open-road density = 1.7 mi/mi^2 **Elk Winter Range:** 4% winter range < 25 years old **Northern Goshawk:** 5,745 acres of available nesting habitat and 8,752 acres of available foraging habitat. **Pileated Woodpecker:** 5,745 acres of available nesting habitat and 7,381 acres of available foraging habitat. **Pine Marten:** 6,363 acres of available habitat. **Fisher:** 2,550 acres of available winter habitat **Flammulated Owl:** 350 acres of available habitat **Western Toad:** 7,000 acres of available habitat **Wolverine:** 600 acres of available habitat
Alt 2	**Canada Lynx:** Timber harvest and precommercial thinning activities would affect 121 acres or 4.5% of available lynx habitat. **Elk Summer Range:** Elk habitat effectiveness decreases to 47%; Forage habitat increases to 9%; and Standard open-road density increases to 1.8 mi/mi^2 **Elk Winter Range:** Winter range < 25 years old increases to 7% **Northern Goshawk:** 50 acres (0.9%) of nesting habitat affected and 431 acres (4.9%) of foraging habitat affected. **Pileated Woodpecker:** 50 acres (0.9%) of nesting habitat affected and 954 acres (12.9%) of foraging habitat affected. **Pine Marten:** 433 acres (6.8%) of habitat affected. **Fisher:** 10 acres of available winter habitat affected **Flammulated Owl:** 35 acres of available habitat affected **Western Toad:** 130 acres of available habitat affected **Wolverine:** 28 acres of available habitat affected

Resource Issue	Comparison Summary of Effects
Alt 3	**Canada Lynx:** Same as for Alternative 2. **Elk Summer Range:** Same as for Alternative 2. **Elk Winter Range:** Same as for Alternative 2. **Northern Goshawk:** 50 acres (0.9%) of nesting habitat affected and 379 acres (4.3%) of foraging habitat affected. **Pileated Woodpecker:** 50 acres (0.9%) of nesting habitat affected and 821 acres (11.1%) of foraging habitat affected. **Pine Marten:** 371 acres (5.8%) of habitat affected. **Fisher:** No acres of available habitat affected **Flammulated Owl:** No acres of available habitat affected **Western Toad:** 110 acres of available habitat affected **Wolverine:** 24 acres of available habitat affected
Sensitive Plants – Plants that may occur within the analysis area could be affected by proposed management activities.	
Alt 1 – No Action	There would be “no impact” to sensitive plants in the area.
Alts 2 and 3	For most species, the effects of these alternatives would be about the same, with Alternative 2 proposing more activities that transform habitat. For all sensitive plant species included in this analysis, the effects determination for each alternative would be “may impact individuals or habitat but not likely to cause trend towards federal listing or reduce viability for the population or species.”
Soil Stability and Landslide Hazard Potential – Proposed activities can cause surface erosion and/or mass wasting erosion events.	
Alt 1 – No Action	There would be no activities proposed on landtypes having high landslide hazard potential.
Alts 2 and 3	Seven treatment units, totaling 292 gross acres, are proposed on landtypes having high landslide hazard potential. Treatments would be designed to avoid increasing the landslide risk in these units (see design measures 3 and 4).
Soil Productivity – There are areas with existing detrimental soil disturbance that could be affected by proposed activities.	
Alt 1 – No Action	No activities are proposed.
Alt 2	Five units (5, 7, 10, 13 and 27) would require specific design measures to keep DSD below the 15% for each unit and comply with the Regional soil standard (see design measures 6, 7 and 8).
Alt 3	Three units (5, 10, and 13) would require specific design measures to keep DSD below the 15% for each unit and comply with the Regional soil standard (see design measures 6, 7 and 8).
Tribal Treaty Rights – Effects of activities on fishing, hunting, and gathering (roots and berries).	
Alt 1	There would be little to no impact on fishing, hunting, or gathering.
Alts 2 and 3	Proposed timber harvest would produce long-term improvements in forest health, which may benefit tribal hunting and gathering activities. Proposed watershed improvement activities may benefit tribal fishing over the long-term.
Watershed Condition – Proposed activities could affect equivalent clearcut area, road density, and sediment production.	
Alt 1 – No Action	Existing condition: ECAs range from 0.3 to 7% Sediment yield percent over natural conditions is within Forest Plan standards. Average road density = 6.1 mi/mi^2
Alts 2 and 3	ECAs range from 0.3 to 12%, which is within acceptable limits. Probability of sediment delivery is low (less than 10%) and within Forest Plan standards. Average road density = 3.6 mi/mi^2, a reduction of 2.5 mi/mi^2

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CHAPTER 1

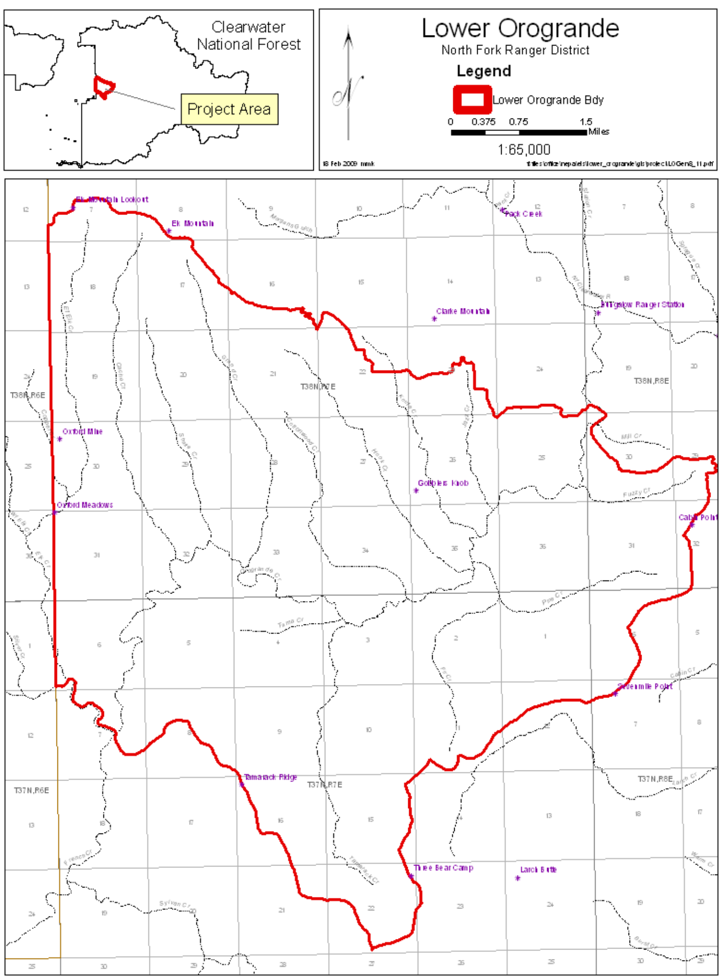
PURPOSE AND NEED FOR ACTION

This chapter discusses current and desired conditions, purpose and need for action, proposed action, management direction, scope of the analysis, availability of project files, and the organization of the Environmental Impact Statement.

I. Introduction

The North Fork Ranger District of the Clearwater National Forest is proposing the Lower Orogrande project that is located entirely within the Orogrande Creek watershed, which contains the Tamarack Creek, Jazz Creek, and Pine Creek sub-watersheds as part of the headwaters of the North Fork Clearwater River Subbasin. The 21,560-acre project area is in portions of Townships 37 and 38 North; and Ranges 6, 7, and 8 East, Boise Meridian, Clearwater County, Idaho, as shown below:

Figure 1 – Vicinity Map



A. Current Conditions

The following resource descriptions are the result of the review of past records and the collection of field data:

Watershed: Existing conditions in area streams show high cobble embeddedness, low pool quality, and insufficient wood in stream areas for fish habitat. Most of these problems are related to past harvest activities, with the greatest impacts due to associated road systems. There are also numerous barriers (i.e. undersized culverts) to the passage of fish and other aquatic organisms.

Vegetation: Due to past management activities, absence of major fires, and insect and disease factors, the current vegetation is fairly homogeneous, dominated by 40-100 year-old grand fir. White pine and other seral tree species currently make up approximately 6% of the total composition. Recent surveys show the grand fir beginning to show signs of spreading root disease and other pathogens.

The current distribution of successional stages has shifted away from the historic range because of past fires, timber harvest, and fire suppression. Early and late seral habitats are under-represented, while mid-seral habitats are over-represented.

Wildlife: Habitat availability is limited for wildlife species that rely on early and late seral vegetation structure. Foraging habitat for big game is declining due to advancing forest succession. Although sufficient hiding and thermal cover appear to be present across the analysis area on both summer and winter big game ranges, the availability of security habitat is very low in many parts of the analysis area because of the large number of roads open to summer motorized use.

B. Desired Future Conditions

The desired future conditions (DFCs) have a 50-year planning horizon and are based on those found in the Forest Plan, plus Forest-wide goals and objectives. Each DFC has been further modified, as necessary, to account for actual on-the-ground conditions within the Lower Orogrande area. The DFCs for each resource area are as follows:

Watershed: The Forest Plan Desired Future Water Conditions maintain integrity of all streams (FP, page II-27), manage water quality and stream conditions so management activities do not cause permanent or long-term damage to beneficial uses (FP page II-27), and develop prescriptions on a case by case basis to ensure desired multiple use outputs while recognizing domestic water supply needs in public supply watershed (FP Water Quality Standard, page II-29). Management Area direction includes meeting water quality standards through the use of best management practices (Forest Plan Management Area E1 standard, page III-58).

Water yield is maintained so as not to negatively affect bank stability. This is measured as equivalent clearcut acres (ECA), in which measures of less than 20% of a subwatershed are considered good (NOAA, 1998). Desired road densities less than 3 miles per square mile are located away from streams in order to minimize sediment to streams. They also contain adequate drainage that flows onto the forest floor and not directly into stream channels (NOAA, 1998).

Forestwide management direction for fishery streams are to maintain existing high quality habitat and rehabilitate and improve conditions in degraded streams (Forest Plan, page II-2). High quality habitats have low cobble embeddedness and sediment amounts are at natural levels. There is an adequate balance of pools and riffles throughout the watershed and pools are of high quality. Woody debris in the streams provide good fish habitat and potential debris is plentiful and fish-bearing streams are shaded and cool (INFISH, 1995).

Vegetation: A diverse and healthy forest covers the landscape. Forest stands are still mostly comprised of grand fir and Douglas fir, but with greater concentrations of western white pine, western larch, and ponderosa pine. Incidence of insect and disease is low, and stand conditions that are resilient allow for rapid recovery.

There is a balance of successional stages; early successional (15 – 45%); young mid-successional (10 – 40%); mature mid-successional (30 – 55%); and old forest (15 – 40%). Sufficient old-growth stands have been identified and protected to meet established goals and provide habitat for old-growth dependent species (Forest Plan DFC, page II-18).

Wildlife: As a result of elk habitat improvement programs, especially browse burning and timber harvest on winter range, there is an increase in habitat to support elk herds (Forest Plan DFC, page II-18). A balance of vegetative successional stages provides habitat diversity for wildlife species. The number of open roads and overall summer motorized use has been reduced, resulting in an increased availability of security habitat.

II. Purpose and Need for Action

The Orogrande Ecosystem Analysis at the Watershed Scale[1] (EAWS) was completed in 2004 for the entire Orogrande Creek watershed, which includes the Lower Orogrande area. It states, "The Orogrande Creek watershed has been disturbed and changed from its historical condition by wildfire, roading, and timber harvest. Each of these disturbances can have an effect on the hydrograph and increase annual and peak stream flows, as well as increasing erosion and sediment delivery to streams." The EAWS lists the following recommendations specific to Tamarack Creek, Jazz Creek, and Pine Creek:

- Restore watersheds through road decommissioning/intermittent storage, culvert replacement, road maintenance (road reconstruction and surfacing), and planting riparian species in RHCA areas (focus within 150 feet of streams).
- Evaluate collector and major local roads for reconstruction and surfacing needs.
- Where not limited due to unstable landtypes and past landslides, use timber harvest to restore desired species (i.e. white pine).
- Create early successional stages and retain late successional habitat.
- Retain large patches of old forest.

The EAWS recommendations and other resource concerns are reflected in the following purpose and need statements for this project:

A. Watershed Improvement

Purpose: Reduce stream sediment (i.e. reduce road densities and control erosion sources on roads to be retained, especially in riparian habitat conservation areas (RHCAs).

Need: There is a need to reduce sediment input to streams from roads. Excessive instream sediment has the potential to reduce the survival of aquatic species (fish, amphibian, insects). Past area road failures in 1995 and 1996 contributed large amounts of sediment to streams. Sediment levels are

[1] The Orogrande EAWS is not a decision document, and is incorporated by reference for the Lower Orogrande analysis.

currently higher than desired in most area streams. Reducing existing chronic inputs would allow habitat conditions to improve over time.

Purpose: Remove barriers to fish passage and other aquatic organisms to allow for unrestricted access to historic habitats.

Need: There is a need to allow fish and other aquatic organisms access to their historic habitats. Most of the culverts in this area were installed prior to the mid-1990s. They typically were not designed to provide for fish passage or stream simulation (natural substrate on the bottom of the culvert) and have restricted upstream access to historic habitats. This can limit the gene pool above barrier culverts as no genetic interchange from downstream organisms can occur. The focus of replacements are on fish bearing streams as amphibians and insects are less affected by these barriers; both have terrestrial life stages which allows them to move around barriers.

B. Vegetation

Purpose: Restore white pine and larch (regeneration harvest), improve stand vigor (commercial thinning), and start the trend to improve species diversity and balance vegetative successional stages across the landscape to create stand conditions that are resilient and allow for rapid recovery after disturbances.

Need: There is a need to restore tree species composition consistent with making these stands more resilient to change agents, such as insects and disease. Past events of the early 1900s (i.e. large scale industrial timber harvest, white pine blister rust, and to some extent fire suppression) greatly reduced the presence of western white pine and other seral species. With these tree species greatly reduced, the stands reforested naturally to higher percentages of grand fir and Douglas-fir, which are less resilient to disturbance agents, in particular, insects and diseases.

Past events also created a disproportionately large age class of trees that regenerated after disturbance. These approximately 40-100 year old stands are overstocked, where high tree density is responsible for poor health and low growth vigor. This overstocking along with the large presence of grand fir and Douglas-fir, further enhances the loss of resiliency to insect and disease pathogens. If allowed to continue, these conditions will likely lead to a decline in forest health and put future ecological, societal, and economical values at risk.

C. Wildlife

Purpose: Promote a trend in the balance of successional stages toward the historical range and promote a trend towards increased wildlife security.

Need: The current distribution of successional stages shows the early and late seral habitats being under-represented, while mid-seral habitats are over-represented. This condition affects those wildlife species that rely on early and late seral vegetation structure. Foraging habitat is also limited compared to cover habitat. Opportunities exist to achieve a better balance of successional stages.

The availability of security habitat is very low in many parts of the analysis area because of the large number of roads open to summer motorized use. Opportunities exist to close additional roads to motorized summer use and increase the extent of security habitats. Increasing security habitat would increase the effectiveness of these habitats for many species, plus reduce the vulnerability of big game species.

III. Proposed Action

The proposed action that went out in the revised DEIS has since been reviewed in the field and analyzed against various resource concerns (i.e. riparian buffers and soil stability and productivity). The change of the revised DEIS proposal into the current proposal follows:

A. Revised DEIS Proposal

The following activities were proposed in the revised DEIS, dated October 2012:

Watershed Improvements (see Appendix B for detailed information)

- Decommission 16 miles of system roads and 73 miles of non-system roads.
- Replace 16 undersized culverts.
- Install 3 new fish passage culverts where stream ford crossings currently exist.

Vegetation Treatments (See Table 2.2)

- 660 acres of regeneration harvest. **Note:** Regional approval was obtained for seven units that would exceed 40 acres by themselves or in combination with existing adjacent openings.
- 500 acres of commercial thinning.
    - Approximately 2.4 miles of temporary roads would be needed for logging access.
    - Sixteen existing roads, totaling 23.6 miles would be improved or reconstructed.
    - Seven existing roads, totaling 9.5 miles would be reconditioned.
- Opportunities for up to 660 acres of precommercial thinning.

Access Management

- Restrict road access (closed to all vehicles year round) on 14.5 miles of existing roads to improve elk security. Affected FS Roads are 547B, 547D, 5216, 5216G, 5216H, 5216J, 5216K, 5250, 5250A, 5251A, 5251B, and 5254.

Changes to the Proposal: Field layout activities, conducted during the summer and fall of 2013, implemented design measures 1-3 (refer to page 23 of Chapter 2). This resulted in reduced acreage proposed for treatment and in some cases eliminated entire units. The remaining units left for treatment required less road access, which reduced the miles of road reconstruction. The miles of newly constructed temporary road remained the same. However, existing road templates were proposed for the reconstruction of additional temporary roads needed for access, which aided in keeping detrimental soil disturbance below the 15% standard (refer to design measure #6). Like the newly constructed temporary roads, the reconstructed temporary roads would be decommissioned after use. This would aid the watershed condition by removing those existing road templates from the landscape.

B. Current Proposal

After applying the results of field layout activities to the revised DEIS proposal, the current proposal consists of the following activities:

Watershed Improvements (see Appendix B for detailed information)

- Decommission 16 miles of system roads and 73 miles of non-system roads.
- Reconstruct Road #547 to provide access for road decommissioning activities.
- Replace 16 undersized culverts.
- Install 3 new fish passage culverts where stream ford crossings currently exist.

Vegetation Treatments (See Table 2.2)

- 350 acres of regeneration harvest. **Note:** Regional approval was originally obtained for eight units exceeding 40 acres. However, due to recent unit layout activities, only one unit remains that would exceed 40 acres.
- 140 acres of commercial thinning.
    - o Construct 2.4 miles[2] of temporary roads, to be decommissioned after use.
    - o Reconstruct 4.3 miles of temporary roads on existing templates, to be decommissioned after use.
    - o Reconstruct 14.7 miles of existing roads.
    - o Recondition 20.2 miles of existing roads.
- Opportunities for up to 660 acres of precommercial thinning.

Access Management

- Restrict road access (closed to all vehicles year round) on 14.5 miles of existing roads to improve elk security. Affected FS Roads are 547B, 547D, 5216, 5216G, 5216H, 5216J, 5216K, 5250, 5250A, 5251A, 5251B, and 5254.

IV. Management Direction

The analysis area encompasses approximately 21,560 acres, of which approximately 5,100 acres were acquired through a series of land exchanges with private timber companies between the years 1955 and 1992. The proposed resource management actions are consistent with the following management direction:

A. Clearwater National Forest Plan

The Clearwater National Forest Plan (September 1987) allots 85% of this area within Management Area E1, timber producing lands. Management area M2 consists of riparian areas found in all management areas. The following table briefly summarizes the distribution and direction of each management area:

[2] Actual miles may vary up or down, based on final field layout and implementation of Design Measure #9.

Table 1.2 – Forest Plan Management Areas

Management Areas	Acres	Direction
C4	2,960	**Big-Game Winter Range w/Timber –** Manage to provide sufficient forage and cover for existing and projected big-game populations and achieve timber production outputs (Clearwater Forest Plan, page. III-47).
C8S	120	**Big-Game Summer Range and High Fishery Stream Values –** Manage these areas to maintain high quality wildlife and fishery objectives while producing timber from the productive Forest land (Clearwater Forest Plan, page. III-53).
E1	18,370	**Timber Producing Lands** – Manage to provide optimum, sustained production of wood products and viable elk populations while providing adequate protection of soil and water quality (Clearwater Forest Plan, page. III-57).
M2	Inclusions	**Riparian Areas –** Manage under the principles of multiple use as areas of special consideration, distinctive values, and integrated with adjacent management areas to the extent that water and other riparian dependent resources are protected (Clearwater Forest Plan, page. III-69).
US	110	**Unsuitable Lands –** Manage to maintain and protect soil and watershed values and vegetative cover.

Forest Plan Lawsuit Stipulation of Dismissal: In February 1993, the Sierra Club and the Wilderness Society representing nine co-plaintiffs filed two lawsuits against the Clearwater National Forest Plan. On September 13, 1993, the Forest Service signed a settlement with all parties and agreed to: (1) an annual timber offer not to exceed 80 million board feet per year; (2) prepare an EIS for new roads and timber sale projects which directly affect verified old-growth stands 100 acres or larger; (3) not complete any final road or timber sale decisions in areas covered by the proposed "Idaho Wilderness, Sustainable Forest and Communities Act of 1993," HR-1570; and (4) proceed only with projects, which would result in "no measurable increase" in sediment production in drainages currently not meeting Forest Plan standards. These agreements remain in effect until a Forest Plan revision is completed.

Clearwater Forest Plan Water Quality Standards are found in the Clearwater National Forest Plan on pages II-27 through II-29 and are also described in the Watershed Report for this project. The Clearwater Forest Plan was amended in 1995, following a joint decision (commonly called INFISH) by the U.S. Forest Service and Bureau of Land Management for managing inland native fish on Federal lands, including the Orogrande Creek drainage.

Interim direction provided by INFISH:

- identifies and defines Riparian Habitat Conservation Areas (RHCAs),
- establishes Riparian Management Objectives (RMOs), and
- applies standards and guidelines to RHCA to meet the RMOs.

INFISH default RHCAs include those areas within 300 feet of fish bearing streams, within 150 feet of non-fish bearing perennial streams, within 100 feet of intermittent streams and wetlands, and 150 feet from the edge of wetlands larger than one acre. INFISH buffer widths exceed State best management practice standards (BMPS). Activities that do not meet the RMOs are not allowed within default RHCAs.

B. Clean Air Act

The Clean Air Act, passed in 1963 and amended numerous times since then, is the primary legal authority governing air quality management. This Act provides the framework for national, state, and local efforts to protect air quality. The Montana/Idaho State Airshed Group was formed to coordinate all prescribed burning activities in order to minimize or prevent impacts from smoke emissions and ensure compliance with the National Ambient Air Quality Standards (NAAQS) issued by the Environmental Protection Agency (EPA), the federal agency charged with enforcing the Clean Air Act. The USDA Forest Service, including the North Fork Ranger District, is a member of this Airshed Group. All post-harvest site preparation and fuel reduction treatments would be conducted according to the requirements of the Montana/North Idaho Smoke Management Unit guidelines.

C. Clean Water Act

The Clean Water Act stipulates that states are to adopt water quality standards. Included in these standards are provisions for identifying beneficial uses, establishing the status of beneficial uses, setting water quality criteria, and establishing Best Management Practices (BMPs) to control non-point sources of pollution. Executive Order 12088 also requires the Forest Service to meet the requirements of the Act. The State of Idaho has determined that roads are a non-point source of pollution, however the EPA has recently (2010) determined that they are a point source.

Section 313 of the Clean Water Act requires Federal agencies to comply with all Federal State, interstate, and local requirements, administrative authority, and process and sanctions with respect to control and abatement of water pollution.

Section 303(d) of the Clean Water Act stipulates that states must identify and prioritize water bodies that are water quality limited (i.e., water bodies that do not meet water quality standards). For waters identified on this list, states must develop a total maximum daily load (TMDL) for the pollutants, set at a level to achieve water quality standards. Orogrande Creek and its tributaries have been listed as impaired for water temperature. A Subbasin Assessment and Total Maximum Daily Loads (TMDL) report was written and approved in 2003; however no implementation plan has been completed. The Lower Orogrande project has been designed to cause no increase to stream temperatures and to maintain all beneficial uses.

Section 402 of the Clean Water Act states that a National Pollutant Discharge Elimination System (NPDES) permit is required for point source discharges including stormwater runoff from logging roads that is collected by and then discharged from a system of ditches, culverts. However, NPDES permits for the Lower Orogrande Project are not required at this time, because the EPA (December 12, 2012) revised the stormwater regulations to clarify that an NPDES permit is not required for stormwater discharges from logging roads (40 CFR Part 122; Fed. Reg. Vol. 77, No. 236).

Section 404 of the Clean Water Act requires permits to dredge or fill within waters of the United States. The US Army Corps of Engineers administers these provisions. Stream crossing removal activities proposed under the project would require authorization under Section 404, through application under a nationwide permit.

State Water Quality Standards – Environmental Protection Agency regulations require each state to adopt an anti-degradation policy as one component of its water quality standards. The objective of the Idaho Anti-degradation Policy is, at a minimum, to maintain and protect existing instream water uses and the level of water quality necessary to protect those uses (IDAPA 16.012501,01). Beneficial uses and water quality criteria and standards are identified in the State of Idaho Water Quality Standards and Wastewater Treatment Requirements (IDAPA 58.01.02).

D. Region 1 Soil Quality Standards

Region 1 FSM Soil Supplement 2500-99-1 updates and clarifies the previous soil quality supplement (FSH 2509.18-94-1, Chapter 2) based on recent research and collective experience. The analysis standards address basic elements for the soil resource: (1) soil productivity (including soil loss, porosity; and organic matter), and (2) soil hydrologic function. These Regional Soil Quality Standards require that detrimental management impacts to the soil resource do not exceed 15 percent of an activity area and that retention of coarse woody material is appropriate for the habitat type. Detrimental impacts include compaction, rutting, displacement, severely burned soil, surface erosion and soil mass movement. In areas where more than 15% detrimental soil conditions exist from prior activities, the cumulative detrimental effects from project implementation and restoration should not exceed the conditions prior to the planned activity and should move toward a net improvement in soil quality.

E. Travel Management, Designated Routes and Area Motor Vehicle Use Rule 2005

Known as the OHV Rule, it is intended to enhance management of motorized and non-motorized recreation opportunities, and requires the establishment of a system of roads, trails and areas designated for motor vehicle use. To meet the direction provided in the OHV Rule, the Clearwater National Forest released the Final Environmental Impact Statement for Travel Planning in August 2011. The Record of Decision was later signed by Forest Supervisor Rick Brazell on November 10, 2011. A Motor Vehicle Use Map (MVUM) is currently being prepared for the Forest.

Roads Analysis: A Roads Analysis for the Lower Orogrande project that included a minimum roads analysis was the basis for all proposed road activities and restrictions. Most of the roads proposed to be restricted year-round to all vehicles (RYA) are listed in the Travel Plan as open year-round to some (OYS). This analysis took a more detailed look at each road, compared to that under the Travel Planning effort. The Lower Orogrande decision would therefore be used to update the MVUM to change the designation of these roads from OYS to RYA.

Executive Order (EO) 11644: National direction for travel planning, specifically off-road use of motor vehicles on Federal lands, is provided by EO 11644 of February 8, 1972. Section 3 (2) of the Order states: “Areas and trails shall be located to minimize harassment of wildlife or significant disruption or wildlife habitats.” Section 9, added by **EO 11989** of May 24, 1977, implies that areas or trails can be closed to off-road vehicle use whenever such use is causing considerable adverse effects to wildlife or wildlife habitat. The proposal to close year-round to all vehicles 14.5 miles of roads in key wildlife habitat to improve elk security complies with each Executive Order.

V. Scope of the Analysis

The Code of Federal Regulations (40 CFR 1508.25) requires the Forest Service to consider three types of actions (connected, similar, and cumulative) to determine the scope of the analysis.

Connected Actions are those actions that are closely related. In regards to the Lower Orogrande proposal, connected actions include: (1) the reductions in road densities and the trend towards increased wildlife security; and (2) the timber harvest and promoting a trend in the balance of successional stages for wildlife. Overall, the proposed action is not an interdependent part of a larger action.

Similar Actions are those which, when viewed with other reasonably foreseeable proposed actions, have similarities that provide a basis for evaluating their environmental consequences together, but are not necessarily connected. The watershed improvement, vegetation, and wildlife proposals of Lower Orogrande are considered similar actions, due to each having similar time frames, geographic areas, and purposes.

Cumulative Actions are those actions, which when viewed with other proposed actions have cumulative impacts and therefore should be discussed in the same analysis. This analysis considers the direct, indirect, and cumulative effects of past, present, and reasonably foreseeable future actions. A table listing all known past, present and reasonably foreseeable future actions that overlap the temporal and spatial bounds of the proposal is located in Appendix A.

The scope of this analysis is limited to the specific management activities described in the proposed action. This proposal is not a general management plan for the area, nor is it a programmatic environmental assessment. If the decision maker selects an action alternative, activities could begin in fiscal year 2014. The average duration of a project of this size and complexity is three to five years.

VI. Availability of Project Files

An important consideration in preparation of this EIS has been the reduction of paperwork as specified in 40 CFR 1500.4. In general, the objective is to furnish enough site-specific information to demonstrate a reasoned consideration of the environmental impacts of the alternatives and how these impacts can be mitigated. More detailed information is in the project file in the District planning records and is available for public inspection.

The reader may want to refer to the Clearwater Forest Plan and EIS (USDA 1987). The Lower Orogrande Final EIS is "tiered" to the Forest Plan EIS and Record of Decision, as encouraged in 40 CFR 1502.20. Copies of the Forest Plan, Forest Plan EIS, and Record of Decision are available at libraries in the Clearwater National Forest locale and at the Forest Supervisor and Ranger District offices.

VII. Organization of the Final EIS

This environmental impact statement includes information necessary for the Forest Supervisor to make a decision based on the environmental consequences of proposed actions. Federal regulations specify the kinds of information decision-makers should have to make good decisions. In so doing, this document is organized, as follows:

- Chapter 1 states the purpose and need for the proposed action. The purpose and need is the basis in evaluating alternatives to the proposed action.
- Chapter 2 describes three alternatives in detail, including no action, and summarizes the differences among alternatives, especially in potential environmental impacts.
- Chapter 3 describes the baseline (existing) conditions of each resource area that could be affected by the proposed action or alternative actions.
- Chapter 4 describes the possible environmental consequences of the alternatives.
- Chapter 5 lists the interdisciplinary team that prepared the Final EIS.
- Chapter 6 provides the list the public comments to the revised DEIS and our response.
- Other sections include references cited, a glossary, an index, and appendices containing supporting technical information.

CHAPTER 2

ALTERNATIVES INCLUDING THE PROPOSED ACTION

This chapter is divided into identification of the issues, a discussion of each alternative considered in detail, a listing of the alternatives eliminated from detailed study, and a comparison of the alternatives as to how they address the project purpose and issues.

I. Issues

Project issues were identified by the interdisciplinary team (ID Team) and through public scoping and are grouped into one of four categories, as follows:

A. Issues used to Develop Alternatives to the Proposed Action

Use of Existing Roads: "Due to existing sediment problems created by new road construction, any proposed management activities should be limited to existing roads." This comment is the basis of Alternative 3 that only uses the existing road system and does not construct any temporary roads. Also, road decommissioning is being considered with each action alternative to reduce current road densities and to remove the potential for sediment input into area streams.

Watershed Improvements Only: "An alternative that does real restoration (watershed improvement through road elimination) and does not engage in more harm (logging an already heavily logged area) needs to be analyzed." This comment was the basis of Alternative 4, which was eliminated from detailed study, as explained in Section IV of this chapter.

B. Issues addressed through Design / Mitigation

Access Management: This issue responds to the effects on public access and dispersed camping opportunities due to proposed road decommissioning and reconstruction activities, plus the effects of access restrictions aimed at improving elk security.

Issue Indicators:

- Number of miles of system road decommissioned
- Number of miles of non-system road decommissioned
- Number of miles of road reconstruction/improvement
- Number of miles of road reconditioning
- Number of miles of year-round road restrictions

Aquatic Habitat: There are two parts to this issue: (1) removing unneeded system and non-system roads within riparian habitat conservation areas (RHCAs); and (2) increasing the amount of habitat that is accessible to a variety of fish species, including sensitive species westslope cutthroat trout.

Issue Indicators:

- Miles of roads removed within RHCAs
- Miles of access to historic fish habitat restored

Climate Change: This issue focuses on the potential effect of the proposed project on climate change and the effect of climate change on the proposed project.

Issue Indicator:

- Qualitative effects on green-house gas emissions and carbon sequestration

Economic Feasibility: There are two parts to this issue: (1) providing for a cost efficient timber sale offering; and (2) providing funding to complete proposed non-timber sale activities.

Issue Indicator:

- Appraised value

MIS Species of Wildlife[1]: Proposed timber harvest, road activities, and motorized access may impact the following management indicator species of wildlife:

Elk – Elk Habitat will be evaluated using the Interagency Guidelines for Evaluating and Managing Elk Habitats and Populations in Central Idaho.

Issue Indicators for Elk Summer Range:

- Elk habitat effectiveness (%)
- Forage habitat (%)
- Standard open-road density (mi/mi^2)

Issue Indicator for Elk Winter Range:

- Elk winter range < 25 years old (%)

Northern Goshawk – This species nests in mature timber stands with high canopy cover and open understory. Foraging areas are diverse forested and open habitats.

Issue Indicators:

- Acres of nesting habitat affected
- Acres of foraging habitat affected

Pileated Woodpecker – Mature timber stands, having high canopy cover, large snags, and down logs, are preferred by this species of woodpecker. It also inhabits second growth trees of sufficient size and maturity.

Issue Indicator:

- Acres of nesting habitat affected
- Acres of foraging habitat affected

Pine Marten – Dense mixed and coniferous forests, which usually include abundant fallen logs, stumps, and shrubs, are preferred by this species.

Issue Indicator:

- Acres of suitable habitat affected

Sensitive Species of Wildlife: Proposed timber harvest, road activities, and motorized access may impact the following sensitive species of wildlife:

[1] Other sensitive and/or MIS species of wildlife are not included due to non-occurrence, lack of habitat, or not being affected by proposed activities. (Refer to the MIS & TES Wildlife Resources Status Report in the project file for more details.)

Fisher – This species prefers mature to old growth coniferous forests containing a diversity of habitat types and successional stages.

Issue Indicator:

- Acres of available fisher habitat affected

Flammulated Owl – Open grown mature ponderosa pine and Douglas-fir stands are preferred by this species.

Issue Indicators:

- Acres of available habitat affected
- Acres of habitat improvement

Western (Boreal) Toad – This species prefers shallow areas with mud bottoms and high temperature, often in sites with vegetation present for breeding.

Issue Indicator:

- Acres of available habitat affected

Wolverine – Although not dependant on any particular vegetative habitat type, this species prefers large isolated tracts of roadless areas supporting a diverse prey base.

Issue Indicator:

- Acres of available habitat affected

Threatened Species of Wildlife: Proposed timber harvest, road activities, and motorized access may impact the following threatened species of wildlife:

Canada Lynx – This species prefers relatively high-elevation moist conifer forest, which is limited within the Orogrande drainage.

Issue Indicator:

- Acres of available lynx habitat affected

Sensitive Plants: There are 14 sensitive plant species that may be affected by proposed activities, with only one known to occur in the area. As required by Forest Service policy, specific habitat needs for sensitive plants as defined in the Regional Sensitive Species List will be reviewed, and a Biological Evaluation for the appropriate sensitive species will be completed.

Issue Indicator:

- Acres of potential sensitive plant habitat affected

Soil Stability and Landslide Hazard Potential: Surface erosion (e.g. sheet, rill, gully erosion) and mass wasting erosion events (e.g. landslides) impact soil productivity, water quality and channel morphology. Soil erosion can result in decreased soil productivity at a site due to the loss of surface soils, and removal of vegetation and/or ground disturbance associated with timber harvest or fire can increase erosion on certain landtypes.

Issue Indicator:

- Acres of proposed activities on landtypes having high landslide hazard potential resulting from slope steepness, parent material, landform, aspect or elevation.

Soil Productivity: Past management activities (e.g. timber harvest, roads, mining) in the project area have caused detrimental soil disturbance (e.g. compaction, displacement, erosion, organic matter loss) and decreased soil productivity. Surface soils in the project area, and particularly those with intact ash-derived surface soil, are fundamental in supporting site productivity due to much greater water infiltration rates and moisture- and nutrient-holding capacities than underlying soil horizons. Ash-derived soils are common in much of the project area have low bearing capacity and therefore are highly susceptible to compaction, displacement and loss of site productivity. The Region 1 Soil Quality Standards require that detrimental soil disturbance from management activities does not exceed 15% of an activity area and that coarse woody material retention is appropriate to the habitat type. In areas that exceed 15 % detrimental soil disturbance, the combined detrimental disturbance effects of the current project (implementation and restoration) should not exceed the disturbance levels present before the activity and activities should be directed toward a net improvement in soil quality.

Issue Indicator:

- Treatment units requiring specific design measures to keep detrimental soil disturbance below the 15 % Regional soil standard.

Tribal Treaty Rights: The Nez Perce Tribe has specific treaty reserved rights that take place on what is now federal land, including the Clearwater National Forest. Article 3 of the 1855 Treaty with the Nez Perce Tribe states: “the exclusive right of taking fish in all the streams where running through or bordering said reservation is further secured to said Indians; as also the right of taking fish at all usual and accustomed places in common with citizens of the Territory; and of erecting temporary buildings for curing, together with the privilege of hunting, gathering roots and berries, and pasturing their horses and cattle upon open and unclaimed land.”

Consultation with the Nez Perce Tribe will continue with this project analysis. Nez Perce fishing, hunting, and gathering rights will be protected.

Watershed Condition: This issue has three parts: (1) maintaining equivalent clearcut area, a measure of water yield, below 20%; (2) minimizing the potential of proposed management activities to increase sediment production and delivery into streams; and (3) aiming for a road density, a measure of watershed condition, of less than 1 mi/mi^2.

Issue Indicators:

- Percent increase in equivalent clearcut area (ECA)
- Sediment yield (tons) increased as modeled by WEPP
- Road density (miles/miles^2)

C. Issues decided by law or policy, or not affected by the proposal.

These issues will not be considered in detail.

Air Quality: Smoke emissions produced during prescribed fire for site preparation following timber harvest may affect air quality.

All alternatives to be considered will adhere to the Clean Air Act and implementation would occur according to the procedures outlined in the North Idaho Smoke Management Memorandum of Agreement.

Heritage Resources: Archaeological sites are evident throughout the analysis area that could be affected by proposed activities.

In compliance with the National Historic Preservation Act, heritage surveys will be conducted in the area to identify any significant heritage resources, cultural, archaeological or historical sites. Potential direct and indirect effects to any such sites will be assessed and considered during project planning, plus, the Forest Archaeologist will consult with the Nez Perce Tribe and Idaho State Historic Preservation Offices regarding the project. Also, see mitigation measure #14.

Old Growth Habitat – The Forest Plan standard for old growth states that 10% across the Forest will be designated as old growth. The Clearwater National Forest's current old growth designation falls below ten percent and therefore, new direction was given in 2006 in order to meet the 10% forest-wide standard. On a Forest-wide scale, old growth habitat has been analyzed using Forest Inventory and Analysis (FIA) data. A complete description of the data and methodology used is available in the following report; *Detailed Estimates of Old Growth, Clearwater National Forest by Renate Bush et al. (2006)*. Currently, FIA data shows 9.4% old growth on all forested lands on the Clearwater National Forest with a 90% confidence interval of 7.3% to 11.8%. In order to insure that the Forest is moving towards meeting the Forest Plan standard of maintaining at least 10% old growth, current Forest direction (Dec. 2006) is to retain stands that meet the following guidelines: 130+ years old and having 10 or more trees per acre over 21″ dbh (for non-lodgepole pine habitat types). These stands are termed "step down" and are within 20 years of meeting the Green et al. (1992) old-growth definition. An analysis of the FIA data shows that the Forest will exceed the 10% standard in 2012, and by 2022 not only will the mean be above the 10% Forest Plan standard but the lower bound of the 90% confidence interval will be at 10.3% (with the upper bound at 15.5%).

Current Clearwater National Forest old growth management strategy is **not** to use regeneration harvest to treat any stands qualifying as step down. All treatment areas proposed for Lower Orogrande have been cross-checked with the Forest old growth data base. By definition, no stands of old growth (150+ years old) or stands that qualify as step down (130+ years old) are proposed for treatment.

The Forest Plan standards for old growth habitat also state that the Forest will manage at least 5% of each 10,000-acre old growth analysis unit (OGAU) as old growth. Where suitable old growth stands do not exist, old growth replacement stands will be selected to meet the 5% minimum. The Lower Orogrande analysis area lies within OGAUs 109, 111, 112, and 113. Currently, each OGAU exceeds the 5% standard through a combination of defined old growth and step down stands (refer to Appendix D for an old growth summary and map).

Size of Openings: Eight of the treatment units proposed for regeneration harvest (by themselves or in combination with existing adjacent openings) are over 40 acres in size and are described further in this chapter (Section II, Alternatives Considered in Detail). A 60-day public review period was initiated with the release of the original DEIS. Approval to exceed 40 acres was received from the Regional Office on June 21, 2011. Alternative 5, which would not exceed the size of opening limitation, was considered and later eliminated from detailed study, as explained in Section III of this chapter.

Snag Habitat: "A sufficient number of snags need to be left standing in each treatment area for cavity nesters until snags can be replaced by natural recruitment." This project would follow Regional snag/live tree retention guidelines within proposed timber harvest units (refer to design measure #12).

Spread of Noxious Weeds: Logging, road and landing construction/reconstruction, and heavy vehicle traffic have the potential to further spread existing weeds and/or introduce new species of weeds.

A decision for the North Fork Noxious Weed Treatment Project (2005) addresses the treatment of noxious weeds on the North Fork Ranger District. There are standard contract provisions that minimize the spread of existing weeds and the introduction of new ones.

Threatened and Endangered Species of Fish, Wildlife, and Plants: The US Fish and Wildlife Service (FWS), Idaho Field Office, publishes a list of Threatened, Endangered, Candidate and Proposed Species by county on their website (USDI FWS 2014). Their list for Clearwater County identifies that bull trout, Canada lynx, and whitebark pine (candidate species) may occur on the North Fork Ranger District. Bull trout, which has a ***may affect, not likely to adversely affect*** call due to proposed precommercial thinning and culvert replacement activities, would not be adversely affected by any of the proposed activities and need not be discussed in detail [refer to the Biological Assessment (11/15/11) completed for this project]. Whitebark pine would also not be affected by proposed activities and need not be discussed in detail. Canada lynx is discussed in detail under the issue of Threatened species.

II. Alternatives Considered in Detail

Public input gained from formal scoping was used in the formulation of alternatives to the proposed action (Alt. 2). This included a “no action” alternative (Alt. 1) and one additional action alternative (Alt. 3) that addresses an issue identified through public scoping. All alternatives were given equal weight, and the remaining issues considered were used to modify the action alternatives.

A. Treatment Methods Common to all Action Alternatives

In recommending treatments, the ID Team looked at a variety of methods to accomplish watershed, vegetative, and wildlife objectives. A key factor in deciding which tool to use was the treatments ability to move the existing conditions toward desired conditions. The following treatments were recommended:

1. Watershed Improvement

Watershed improvement activities, listed in Appendix B, would consist of road decommissioning, replacing undersized culverts, and soil restoration, as follows:

Road Decommissioning[2] – Roads identified as no longer needed for management would be decommissioned to: (1) decrease soil erosion and instream sediment deposition; (2) help restore channel structure and function; and (3) restore hillslope hydrologic processes to a more natural condition. There are four levels of road obliteration that range from full recontouring of the hill slopes (complete obliteration) to abandonment of the road (see project file). The level needed for each road can be a combination of the four levels and is based on detailed road surveys. In all cases, stream crossings (if present) are removed and rebuilt to match natural channel configurations and access for motorized vehicles is prohibited.

Culvert Replacement – Sixteen culverts in the project area have been identified for replacement with structures that allow for fish passage. Eleven have been designated as high priority and five as moderate priority for replacement. Work sites would be dewatered and sediment control devices such as straw bales and other materials would be installed to minimize sediment delivery to streams.

Soil Restoration – Improvement of soil productivity would occur in areas detrimentally disturbed by past and proposed management activities. Restoration techniques may include decompaction, seeding/planting, organic matter placement, treatment of noxious weeds, or a combination of techniques. Equipment (excavator, subsoiling grapple rake, forest cultivator, or similar equipment) would be used to decompact soils, recontour skid trails and landings with cutslopes. Decompacting soils on old skid trails and landings followed by the addition of coarse woody material and other organic matter would be the primary technique to improve soil productivity through improved soil structure, aeration, root penetrability and soil biological activity. This restoration technique is specifically applied to units expected to have detrimental soil disturbance near 15% following harvest.

[2] Road decommissioning is proposed to correct existing resource problems and not to mitigate for other elements of this project.

2. Timber Harvest

The objective of this treatment is to manage forest resources for a sustained yield of timber in a variety of age classes while providing for other resources such as wildlife, plants, and soil productivity. Support for these resources is provided through the retention of trees in a variety of amounts and locations. The following provides a brief description of each Silvicultural prescription and the tree retention guidelines:

Regeneration Harvest: This harvest method would remove most of the existing mature stand, producing a site with high sun exposure that would provide optimum growing conditions for the new stand. Restocking of the harvest unit would occur through the planting of western white pine and western larch, with some natural regeneration of Douglas-fir, grand fir, and western redcedar. Varying numbers of trees would be retained for future snag recruitment, wildlife habitat, soil productivity, and soil stability. This would ensure that snag levels would meet Northern Region Snag Management protocol. Approximately five or more snags greater than or equal to 15 inches in diameter would be left to meet Regional snag guidelines in addition to three live tree snag replacements greater than or equal to 15 inches in diameter would be left per acre (Bollenbacher et al., 2009). Retention objectives are to leave tree structure within the units through a combination of clumps and scattered individual live cull trees. Retention guidelines include:

- Leaving about 10-25% of the gross unit acreage in individual trees, INFISH buffers, and clumps of ¼ to 3 acres in size, where possible.
- Locating clumps within blind (tree yarding) leads, benches, ridges, and interior riparian habitat conservation areas (RHCAs) away from unit boundaries and open roads.
- Locating clumps around broken top larger trees that are desirable for cavity nesting birds.
- Retain live cull trees and logger-safe snags between clumps.

Commercial Thinning: This intermediate harvest method reduces tree density to improve growth and enhance forest health by retaining as many early seral tree species as possible. Commercial thinning units would generally be thinned to retain about 100-140 ft^2 of basal area on each acre. This prescription results in the fairly uniform retention of trees across the unit. Some limbs and tops would be retained in the unit for nutrient retention, but not to the level that would pose a fire hazard. Fuels generated by harvest activities will be treated by removing limbs and tops of harvested trees or through other methods in these units to help reduce post-harvest fuels to acceptable levels. Approximately five to nine snags greater than or equal to 15 inches in diameter would be left to meet Regional snag guidelines for intermediate harvest treatments, as safety guidelines allow. Retention objectives are to leave snag tree structure within the units through a combination of clumps and scattered individual live cull trees.

3. Prescribed Fire

Burning following Regeneration Harvest – This would consist of broadcast burning, under burning, jackpot burning or mechanical or hand piling followed by pile burning. This treatment uses the silvicultural treatment of regeneration harvest to restore early-seral, fire-resilient species to the site. The vertical fuel profile is primarily removed with the harvest. Surface fuels are treated as described below to reduce the horizontal fuel profile to acceptable limits. Post harvest fuels in regeneration units are expected to be 50 – 80 tons per acre. Prior to burning, some slashing of residual non-merchantable component may occur to ensure a more continuous fuel bed. The burning and/or mechanical treatments would reduce fuel loading to approximately 17 – 33 tons per acre, depending on the coarse woody debris guidelines for the site. Wetter sites would have retention on the upper end of the spectrum, while drier sites would retain less fuel. Some mortality in leave trees is expected, especially if they are less fire-resilient species. This mortality is acceptable for snag recruitment. Hand surface fuel reduction could be done at the base of some leave trees to protect them better from potential high fire intensity during burning operations.

Jackpot Burning following Commercial Thinning – This treatment would be used to help reduce both natural and harvest activity fuels. It uses the silviculture treatment of Intermediate Harvest with potential for biomass removal and utilization specifications to decrease crown bulk density, increase canopy base height, and decrease ladder and surface fuels. Where possible, it would select for early-seral, fire-resilient species. Remaining surface fuels may then be jackpot burned where unacceptable fuel concentrations still persist, especially where early-seral species exist in the residual overstory. The effects of the burning would be patchy in nature, cleaning up areas where fuel concentrations exist and not burning in areas where fuels are minimal. Multiple entries may be needed to reduce fuels and meet desired objectives while maintaining desired stand composition. Burning could occur in either spring or fall, as prescription parameters and burn windows permit.

Mechanical Treatment following Commercial Thinning – This would consist of a commercial harvest followed by mechanical treatments such as excavator piling and pile burning, yarding of unmerchantable material, mulching, chipping, mastication, or biomass removal and utilization to reduce the surface and ladder fuel component of the residual stand to acceptable levels. Post-harvest fuels are expected to be 40 – 70 tons per acre. Like the jackpot burning described above, treatment of intermediate harvest with biomass removal and utilization to alter the fuel profile such that ladder fuels and canopy bulk density are reduced, canopy base height is raised, and, where possible, fire-resilient, early-seral species are left on-site. Surface fuels remaining on site following harvest activities would then be treated either in their entirety on strategically located portions of the unit suitable for machine work. Surface fuels not worked by machine could be jackpot burned if necessary to complete fuel reduction objectives.

Landing Piles – Timber harvest residue would be piled on designated unit landings. The landing piles created would generally be burned in late fall, after receiving adequate moisture to reduce the spread of fire in open areas and before the piled material becomes too wet to burn.

4. Other Treatments

Precommercial Thinning outside RHCAs: With this treatment, trees less than 8” dbh would be manually thinned with chainsaws to retain western white pine and western larch, where possible. Spacing of retained trees would range from 9'x9' to 12'x12', depending upon stand objectives. Trees would be selected for retention based upon phenotypic superiority, species, and apparent vigor rather than a strict adherence to spacing.

Precommercial thinning may cause short-term increases in surface fuel loading. However, the long-term benefits to fuels management would be the reduction of stand density and the shift in stand composition to long-lived, insect and disease resistant seral species. These benefits would outweigh the short-term hazard created by thinning slash. Thinning slash would be piled on stable ground less than 45% slope outside of default INFISH buffers. There would also be a less than 35% slope runout at the bottom of each pile. Thinning slash would be handpiled and burned along open roads. Within the unit interior, slash would be lopped and scattered.

Small Tree Thinning within RHCAs: This treatment consists of the following:

- Trees less than 8” dbh would be thinned retaining long-lived tree species, such as western red cedar.
- Spacing of retained trees would average 10'x10'.
- Tree thinning would occur within riparian zones, except within 25 feet of water.
- All potential instream and riparian woody debris would be retained.
- No treatment of slash would occur within the full INFISH buffer.
- The purpose of this treatment would be to enhance riparian management objectives, and not commercial timber production.

Table 2.1 – Summary of Proposed Activities by Alternative

	Alt 1	**Alt 2**	**Alt 3**
WATERSHED IMPROVEMENTS			
System Road Decommissioning (mi)	0	16	16
Non-System Road Decommissioning (mi)	0	73	73
Reconstruction of Road #547 (mi)	0	3.9	3.9
Replacement of undersized culverts	0	16	16
Install fish passage culverts	0	3	3
TRANSPORTATION SYSTEM			
Temporary road construction (mi)	0	2.4	0
Temporary road reconstruction[3] (mi)	0	4.3	0
Road Reconstruction/Improvement (mi.)	0	14.7	11.6
Road Reconditioning (mi)	0	20.2	20.2
VEGETATIVE TREATMENTS			
Regeneration Harvest (ac)	0	350	110
Commercial Thinning (ac)	0	140	20
Precommercial Thinning[4] Opportunities (ac)	0	660	660
ACCESS MANAGEMENT			
Year Round Road Restrictions (mi.)	0	14.5	14.5

[3] These temporary roads would be reconstructed on existing templates, to be decommissioned after use.
[4] Approximately 100 acres of the total acreage falls under the definition of small tree thinning.

B. Alternative Descriptions

1. Alternative 1 – No Action

The “no action” alternative means the proposed action would not take place. Although this alternative provides a baseline for comparing the environmental consequences of the other alternatives to the existing condition (36 CFR 1502.14), it is potentially an appropriate management option that could be selected by the Responsible Official. Selection of the “no action” alternative would mean that the following trends would likely continue:

- Soils in areas having existing detrimental soil disturbance would remain unproductive, although, some recovery would occur over several decades.
- Problem roads (i.e. a portion of FS Road 660) would continue to add sediment to area streams, as would the numerous non-system roads in the area.
- A total of 58 miles of existing roads would continue to affect riparian habitat conservation areas, and passage for fish and other aquatic species would remain blocked on 11.5 miles of streams.
- Standard open-road density would remain at 1.7 mi/mi^2, and elk security habitat would remain at approximately 1,200 acres (5% of the total summer range).
- Browse forage production on big game winter range would continue to decline due to increased conifer cover and reduced shrub vigor.
- Tree species composition (mostly grand fir and Douglas-fir) would remain susceptible to insects and disease. More resilient species (white pine and other seral tree species) would continue to make up less than 6% of the total composition.
- Landscape patterns would remain the same, gradually becoming more homogeneous. This increasing homogeneity increases susceptibility to disturbance that could create patch sizes larger than those found historically.
- The current deterioration of grand fir and Douglas-fir stands would begin to produce large volumes of dying, dead, and downed material, which could benefit snag habitat. However, these conditions could also lead to lower carbon stocks and increased carbon emissions due to losses to insects and disease and possible severe wildfire.
- The progression of forest succession would improve habitat for most sensitive plant species. Older habitats favored by these species could see localized declines, due to insect-caused mortality and/or possible intense wildfires. However, the trend overall would be one of increasing habitat suitability.
- Access management in the analysis area would remain the same. Road improvements (i.e. reconditioning and/or reconstruction) having the potential to increase access into the area would not be implemented.

2. Alternative 2 – Proposed Action (Preferred Alternative)

This alternative responds fully to the project's purpose and need for action and would treat a total of 490 acres. The project would be implemented in fiscal year 2016. (See Alternative maps at the end of this chapter for approximate location of proposed activities.)

Watershed Improvements (see Appendix B for detailed information)

- Decommission 16 miles of system roads and 73 miles of non-system roads.
- Reconstruct Road #547 to provide access for road decommissioning activities.
- Replace 16 undersized culverts.
- Install 3 new fish passage culverts where stream ford crossings currently exist.

Vegetation Treatments (See Table 2.2)

- Regeneration harvest 15 units, totaling approximately 350 acres. **Note:** Regional approval was originally obtained for seven units exceeding 40 acres. However, due to recent unit layout activities, only Unit 2 remains that would exceed 40 acres.
- Commercial thin 7 units, totaling approximately 140 acres.
    - Construct 2.4 miles[5] of temporary roads, to be decommissioned after use.
    - Reconstruct 4.3 miles of temporary roads on existing templates, to be decommissioned after use.
    - Reconstruct 17.5 miles of existing roads.
    - Recondition 20.2 miles of existing roads.
- Opportunities for up to 660 acres of precommercial thinning.

Access Management

- Restrict road access (closed to all vehicles year round) on 14.5 miles of existing roads to improve elk security. Affected FS Roads are 547B, 547D, 5216, 5216G, 5216H, 5216J, 5216K, 5250, 5250A, 5251A, 5251B, and 5254.

Table 2.2 – Treatment Unit Summary[6]

Unit	Acres	Treatment	Logging System	Unit	Acres	Treatment	Logging System
1	20	Regen Harvest	T	14	41	Comm. Thin	T/S
2	64	Regen Harvest	T/S	15	25	Regen Harvest	T/S
3	14	Regen Harvest	S	16	39	Regen Harvest	T/S
4	16	Regen Harvest	T/S	17	6	Comm. Thin	S
5	12	Comm. Thin	T/S	18	9	Regen Harvest	T/S
6	21	Regen Harvest	T/S	20	8	Regen Harvest	S
8	12	Regen Harvest	T	21	8	Regen Harvest	S
9	32	Regen Harvest	T	22	13	Comm. Thin	S
10	22	Regen Harvest	T/S	27	12	Regen Harvest	T/S
11	37	Comm. Thin	T/S	28	11	Regen Harvest	S
12	5	Comm. Thin	S	29	36	Regen Harvest	T/S
13	25	Comm. Thin	T/S				

Key: T = Tractor; S = Skyline; T/S = a combination of tractor and skyline systems

[5] Actual miles may vary up or down, based on final field layout and implementation of Design Measure #9.
[6] Compared to what was reported in the revised DEIS, the current units are the result of implementing Design Measure #1-3 during recent unit layout activities to exclude riparian buffers and landslide prone areas.

3. Alternative 3 – Existing Roads

While meeting the project's purpose and need for action, this alternative responds to the public comment asking us to develop an alternative that uses the existing road system. It would treat a total of 130 acres and would be implemented in fiscal year 2016. (See Alternative maps at the end of this chapter for approximate location of proposed activities.)

Watershed Improvements

- Decommission 16 miles of system roads and 73 miles of non-system roads.
- Reconstruct Road #547 to provide access for road decommissioning activities.
- Replace 16 undersized culverts.
- Install 3 new fish passage culverts where stream ford crossings currently exist.

Vegetation Treatments (See Table 2.3)

- Regeneration harvest 6 units, totaling approximately 110 acres.
- Commercial thin 3 units, totaling approximately 20 acres.
    - Reconstruct 11.6 miles of existing roads.
    - Recondition 20.2 miles of existing roads.
- Opportunities for up to 660 acres of precommercial thinning.

Access Management

- Restrict road access (closed to all vehicles year round) on 14.5 miles of existing roads to improve elk security. Affected FS Roads are 547B, 547D, 5216, 5216G, 5216H, 5216J, 5216K, 5250, 5250A, 5251A, 5251B, and 5254.

Table 2.3 – Treatment Unit Summary

Unit	Acres	Treatment	Logging System	Unit	Acres	Treatment	Logging System
5	12	Comm. Thin	T/S	20	8	Regen Harvest	S
10	22	Regen Harvest	T/S	21	8	Regen Harvest	S
12	5	Comm. Thin	S	28	11	Regen Harvest	S
15	25	Regen Harvest	T/S	29	36	Regen Harvest	T/S
17	6	Comm. Thin	S				

Key: T = Tractor; S = Skyline; T/S = a combination of tractor and skyline systems

C. Mitigation or Design Measures Common to all Action Alternatives

Mitigation measures are designed to eliminate or reduce to acceptable levels the effects of proposed activities, and design measures are aimed at avoiding specific resource issues. A majority of these are derived from site specific best management practices (BMP) from the Idaho Forest Practices Act and Stream Channel Alteration Handbook, with comparable practices from the FS R1/R4 Soil and Water Conservation Practices Handbook (FSH 2509.22) that are all described in Appendix C. Both measures are listed below, and the *effectiveness* of the each measure is also included, where applicable.

1. INFISH default buffers are to be used to define timber sale unit boundaries. No timber harvest is to occur within 300 feet of fish-bearing streams, 150 feet of perennial non-fish bearing water, 100 feet of intermittent streams, and 150-foot slope distance from the edge of wetlands larger than one acre. Ignition points for prescribed fire are to be located outside of the INFISH riparian buffers.

Clearwater National Forest audits show INFISH buffers to be 99% effective.

2. Leave a 100 ft. slope distance no-harvest buffer from perimeter of areas that contain unstable soils, such as: (a) moist seeps (wallows, springs) and wetland areas with high water tables (indicated by the presence of hydrophytic vegetation such as sedges, lady ferns, sword fern, *Boykina*, etc.); (b) past landslide locations, and areas of obvious soil movement indicated by curved and/or buttressed tree boles, active soil slumping, soil creep, leaning trees, tension cracks, loose surface rock fragments; and (c) headwalls at or exceeding 60% slope and concave slopes and dissections (horizontally and vertically) that accumulate water.

3. The soil scientist would assist in the layout of Units 19 thru 25 to identify high landslide hazard areas and prescribe site-specific live-canopy retention.

Retention of root strength is important for reduction of landslide hazard (McClelland et al, 1997). Field surveys (pre and post treatment) by Forest Soil Scientists have shown that adjusting canopy retention based on landscape features has been very effective in maintaining slope stability.

4. In areas requiring live canopy retention, the objective of prescribed fire would be to prevent fire entry into these areas. Low-intensity fire may be allowed to back into the edges of some of these sensitive areas and should result in no more than 10% tree mortality in these areas. To further minimize soil impacts, slash is to be piled and burned on existing skid trails, where possible, to overlap detrimental disturbance on already disturbed areas.

Low-intensity prescribed fire and underburning has resulted in incidental mortality of leave-trees, yet mortality is minimal and often limited to edges or isolated trees. Changes to unit boundaries, slash treatment and/or fire prescriptions are routine practices used to avoid or minimize unacceptable slope stability risks.

5. All regeneration harvest units are to have 17-33 tons/acre of downed coarse woody material (>3" diameter) following completion of activities to meet recommended science for coarse woody material. Snags or other trees felled for safety reasons are to be left in the unit.

The rate 17-33 tons/acre of downed coarse woody material is recommended for the habitat types in the project area to maintain soil stability and provide sufficient nutrients and organic matter for long-term soil productivity (Graham et al. 1994).

6. Special attention would be paid to Units 5, 10, and 13 to ensure they stay below 15% detrimental soil disturbance (DSD) after project implementation. Design measures include: (a) locating main skid trails on existing disturbed areas with only a few one-pass trails occurring on undisturbed ground, where possible; (b) spacing skid trails no less than 80 feet part except where converging or when using existing trails; (c) reusing existing trails; and where practical (d) overlapping slash piles on skid trails to avoid creation of new detrimentally disturbed areas.

> *Machine trails can accomplish harvest and site preparation and remain within the 15% standard (Archer 2008), but if uncontrolled, can lead to extensive trails and detrimental soil disturbance. Sale administration and equipment operator skills are necessary for success. Re-use of trails and subsequent decompaction minimizes impacts. Logging systems developed with limits on the potential area affected have been successful in reducing soil compaction by harvest activities (Adams and Froehlich 1981).*

7. In Units 1 through 5, 9 through16, and 27 with high subsurface and parent material erosion potential, excavations for skid trails, temporary roads and landings would be as minimal in depth as possible to minimize disturbance into more erodible subsoils underlying the ashcap topsoil and to support more effective soil recovery. Following use, excavated areas would be recontoured through decommissioning.

8. Logging system layout would designate as much re-use of existing landings and skid trails as possible. All used skid roads and landings would be decommissioned after use to improve soil productivity. Decompaction would be required on all used skid trails where successive passes have taken place over the same trail. The Forest Service would designate the skid trails to be decompacted. Decompaction would span the width of the compacted areas and would be 10-14 inches deep, with the intent to effectively loosen the ground to allow water penetration, allow revegetation, and minimize mixing the subsurface soils with topsoil. The depth of decompaction shall be adjusted to avoid turning up large rocks, roots, or stumps. Equipment would not be permitted to operate outside the clearing limits of the skid trail. Decompaction should be done June 15 to October 15, unless otherwise approved. No decompaction work should be done during wet weather or when the ground is frozen or otherwise unsuitable.

> *New soil disturbance can be minimized by using existing skid trails and/or by designating the locations of new skid trails (Froehlich and McNabb 1983). Logging systems developed with limits on the potential area affected have been successful in reducing soil compaction by harvest activities (Adams and Froehlich 1981). Soil improvement through decompaction and decommissioning activities can only moderately offset soil compaction and displacement but initiate recovery on areas otherwise left in an unproductive condition. Monitoring has shown decommissioning and storage treatments to be effective at reducing surface erosion, mass failure risk and soil bulk density while increasing water infiltration rates, vegetative ground cover and soil organic matter (Foltz 2007, Lloyd et al. 2010, USDA 1999-2009).*

9. The soils scientist would assist in the location of temporary roads to re-use existing disturbed areas and minimize excavation. All temporary roads constructed/reconstructed would later be decommissioned following use. Erosion control stabilization consisting of out sloping and water barring, as specified in the contract, would be required on all temporary roads that overwinter.

> *Road design and mitigation can decrease sediment production (Burroughs and King1989; Burroughs and King 1984) with use of slash windrows, application of gravel and application of seed to disturbed areas. Design of cut and fill slopes at gentler grades decrease likelihood of*

surface erosion. Increasing frequency of drainage structures minimizes the contributing area of surface erosion and sediment introduction to streams (Elliot et al.1999).

10. Best Management Practices as found in Rules Pertaining to the Idaho Forest Practices Act Title 38, Chapter 13, Idaho Code, and Soil and Water Conservation Practices Handbook, FSH 2509.22 would be applied to prevent non-channelized sediment delivery from harvest units to streams in the Lower Orogrande Project area (refer to Appendix C).

BMP implementation and effectiveness rates on similar landforms have been found adequate to prevent sediment delivery to streams as noted in the BMP audits conducted on the Forest from 1990 to 2005.

11. During road decommissioning or conversion to intermittent stored service, measures are to be taken to prevent damaging levels of sediment from entering streams, such as: (a) placing removable sediment traps below work areas to trap fines; (b) when working instream, removing all fill around pipes prior to bypass and pipe removal (where this is not possible, use non-eroding diversion); (c) revegetating scarified and disturbed soils with grasses (weed free) for short-term erosion protection and with shrubs and trees for long-term soil stability; (d) utilizing erosion control mats on stream channel slopes and slides; (e) mulching with native materials, where available, or using weed-free straw to ensure coverage of exposed soils; (f) dissipating energy in the newly constructed stream channels using log or rock weirs; and (g) armoring channel banks and dissipating energy with large rock whenever possible.

Past and ongoing Clearwater National Forest monitoring of road decommissioning projects show these measures to have a High effectiveness (http://www.fs.fed.us/r1/clearwater/ResourceProg/me_09/09MonEvalReportFinal.pdf).

12. For the purpose of maintaining snag habitat, timber harvest prescriptions would follow Regional guidance (Bollenbacher et al. 2009). In regeneration harvest units, approximately five or more snags greater than or equal to 15 inches in diameter would be left, plus three live tree snag replacements greater than or equal to 15 inches in diameter. Retention objectives are to leave tree structure within the units through a combination of clumps and scattered individual live cull trees. Leave clumps of snags mixed with green trees, or lone snags that have little potential to cause safety issues during timber felling. The retention of snags would be avoided near log landings and firelines and within 100 feet below and 200 feet above a road opened to any motorized vehicle. Snag or live retention trees felled for safety purposes would be left in the unit.

Effectiveness is expected to be high, when tree marking guides are properly implemented.

13. If activities impact previously unknown sensitive plant occurrences, the Botanist would be notified, who would direct appropriate measures depending upon the ecology of the plant species involved and the nature of the activity.

Effectiveness is expected to be high, based on past experience with the implementation of other projects, in which new sensitive plant occurrences were brought to the attention of the Forest Botanist and appropriate measures were applied to protect the plants.

14. If additional heritage resources are found during implementation of the project, project activities are to cease. The Forest Archaeologist would then be notified, and an assessment would be made regarding the effect of continued activities on the newly identified heritage resource.

15. Any active goshawk nests found during harvest activities would be protected by establishing a post fledging area (PFA) of 420 acres, where a no-activity buffer zone would be implemented from April 15 to August 15.

D. Monitoring

The following monitoring activities would continue or be initiated with the Lower Orogrande project:

1. The Timber Sale Administrator or Contracting Officer Representative will make periodic checks on the progress of the sale to ensure contractual compliance.
2. INFISH compliance monitoring will be conducted annually by the Forest Fisheries Biologist in conjunction with BMP audits and reported in the annual Clearwater National Forest Monitoring and Evaluation Report.
3. Soils monitoring will occur across the Forest to assess: (a) the accuracy of disturbance estimates; (b) if project design measures, such as live-tree retention, were effective; and (c) if units meet Regional soil quality standards. Sampling will cover all combinations of treatment and yarding methods, including units from this project. Results will be reported in the annual Clearwater National Forest Monitoring and Evaluation Report.

III. Alternatives Considered but Eliminated from Detailed Study

The ID team has considered a total of five alternatives, including a "no action" alternative, which provides a range of reasonable alternatives [40 CFR 1502.14(a)]. Each alternative was reviewed to determine if it: (1) met the purpose and need; (2) addressed the issues; (3) whether or not the alternative was feasible; and (4) whether or not the alternative was consistent with the Forest Plan, laws, and regulations. The following two alternatives were eliminated from more detailed study:

Alternative 4 – Watershed Restoration without Timber Harvest

This alternative was formulated to respond to a comment submitted by an environmental group, who suggested that an alternative that does real restoration (watershed improvement through road elimination) and does not engage in more harm (logging an already heavily logged area) needs to be analyzed. Alternative 4 proposed the following activities:

Watershed Improvements

- Decommission 16 miles of system roads and 73 miles of non-system roads.
- Reconstruct Road #547 to provide access for road decommissioning activities.
- Replace 16 undersized culverts.
- Install 3 new fish passage culverts where stream ford crossings currently exist.

This alternative would not meet the purpose and need, and it has been the policy on this Forest to look at restoration from ridge top to ridge top, using a holistic approach to ecosystem management. Thus, this alternative was dropped from further consideration for the following reasons:

- Vegetative health and aquatic health are intricately linked on this landscape. Alternative 4 would only consider the aquatic needs and not address the vegetative need to improve species diversity and balance vegetative successional stages across the landscape.
- A majority of the Lower Orogrande area is allocated to Management Area E1, with the goal of a sustained production of wood products. Current watershed conditions do not preclude these types of actions.

Alternative 5 – Maximum Size of Openings equals 40 Acres

This alternative would require that the size of each proposed regeneration harvest unit by itself or in combination with adjacent units or openings be 40 acres or less. This alternative would meet the 40-acre size of opening restriction, as described by Section 6 of the National Forest Management Act.

As described in the revised DEIS, it would have affected regeneration harvest Units 1, 2, 10, 15, 16, 20, and 21 which created openings over 40 acres in size under Alternative 2. Due to recent unit layout activities that removed INFISH buffers and landslide prone areas, only Unit 2 remains that would exceed 40 acres in size. Thus, there would be no discernable differences between Alternative 2 and Alternative 5 to merit a separate alternative.

IV. Comparison of Alternatives

A. Comparisons of the Alternatives to the Purpose and Need

1. Reduce stream sediment and remove barriers to fish passage.

Alternative 1 (no action) would not implement any watershed improvement activities. Average road density for the area would remain at 6.1 mi/mi^2; a total of 58 miles of road would continue to affect RHCAs; and undersized culverts would continue to restrict fish passage and other aquatic organisms from 11.5 miles of streams.

Alternatives 2 and 3 would each reduce stream sediment and remove fish passage barriers by: (a) decommissioning 89 miles of roads, resulting in an average road density of 3.6 mi/mi^2; (b) removing 24 miles of roads from RHCAs; and (c) replacing 16 undersized culverts to restore passage for fish and other aquatic organisms to 11.5 miles of streams; and (d) installing 3 new fish passage culverts in place of existing stream ford crossings.

2. Restore species composition and successional stages.

Alternative 1 (no action) would not implement any of the vegetative treatments. Composition of white pine and other seral species would remain at 6%, dominated by dense stands of grand fir and Douglas-fir displaying poor health and low growth vigor, and the balance of successional stages would continue to weigh heavily to the mid-seral stage.

Alternative 2 would best restore species composition and successional stages by: (a) regenerating 350 acres, followed by the planting of western white pine, larch, and other seral species; and (b) commercial thinning 140 acres and precommercial thinning up to 560 acres[7] to reallocate growing space in favor of western larch, ponderosa pine, and healthy white pine. The planting of seral species would cause a 1.6% increase in these cover types, and timber harvest would improve the balance of successional stages with a 1.6% increase in the early seral stage and a corresponding 1.6% decrease in the mid-seral stage.

[7] Approximately 100 acres of the original 660 acres is within the RHCAs and is defined as small tree thinning, without a commercial timber objective.

Alternative 3 would restore species composition and successional stages by: (a) regenerating 110 acres, followed by the planting of western white pine, larch, and other seral species; and (b) commercial thinning 20 acres and precommercial thinning 560 acres to reallocate growing space in favor of western larch, ponderosa pine, and healthy white pine. The planting of seral species would cause a <1% increase in these cover types, and timber harvest would improve the balance of successional stages with a <2% increase in the early seral stage and a corresponding <1% decrease in the mid-seral stage.

3. Balance successional stages and increase wildlife security.

Alternative 1 (no action) would not address the need to balance successional stages and increase wildlife security for the project. The early seral successional stage (0-40 yrs) would continue to be under-represented at 14%, and elk security habitat in summer range would remain at 1,200 acres or 5% of the area.

Alternatives 2 and 3 would each start the trend towards a balance of successional stages, in which the early seral successional stage would increase to approximately 16%. Elk security habitat in summer range would increase by 3,000 to 3,600 acres, affecting a total of 13 to 15% of the area.

B. Comparison of Alternatives by Issues

The following table provides a comparison of the alternatives in relation to the issues described earlier in this chapter:

Table 2.5 - Comparison of Alternatives by Issues

Resource Issue	Comparison Summary of Effects
Access Management – The effects of proposed road activities and access restrictions on public access and dispersed camping.	
Alt 1 – No Action	No road activities proposed.
Alt 2	16 miles of system roads decommissioned – eliminates a thru route 73 miles of non-system roads decommissioned Reconstruct Road #547 – mitigates elimination of thru route 14.7 miles of road reconstruction 20.2 miles of road reconditioning 14.5 miles of year-round road restrictions
Alt 3	16 miles of system roads decommissioned – eliminates a thru route 73 miles of non-system roads decommissioned Reconstruct Road #547 – mitigates elimination of thru route 11.6 miles of road reconstruction 20.2 miles of road reconditioning 14.5 miles of year-round road restrictions

Resource Issue	Comparison Summary of Effects
Aquatic Habitat – Remove roads within RHCAs and increase fish access.	
Alt 1	Existing Condition: 58 miles of roads within RHCAs Passage for fish and other aquatic species is blocked on 11.5 miles of streams.
Alts 2 and 3	24 miles of roads removed within RHCAs 11.5 miles of access to aquatic habitat restored, with 5 miles being on fish bearing streams. 3 new fish passage culverts installed where stream ford crossings currently exist.
Climate Change – Effects of proposed activities on climate change and vice versa.	
Alt 1	Inaction to improve forest resilience could result in lower carbon stocks and increased carbon emissions due to losses to insects and disease and possible severe wildfire.
Alts 2 and 3	Each alternative would take steps to improve forest resilience, which in the long-term would improve the carbon sequestering ability of the treated areas.
Economic Feasibility – Provide for a cost efficient timber sale and funding to complete non-timber sale activities.	
Alt 1 – No Action	na
Alt 2	Appraised value = $612,303. This represents a positive sale offering that could complete a portion of the non-timber sale activities.
Alt 3	Appraised value = $29,202. This represents a positive sale offering that could complete a smaller portion (compared to Alt. 2) of the non-timber sale activities.
Threatened, MIS, and Sensitive Species of Wildlife – Certain species of wildlife could be affected by proposed management activities.	
Alt 1 – No Action	Existing conditions: **Canada Lynx:** Modeled lynx habitat within the project area = 2,694 acres. **Elk Summer Range:** Elk habitat effectiveness = 48%; Forage habitat = 7%; and Standard open-road density = 1.7 mi/mi^2 **Elk Winter Range:** 4% winter range < 25 years old **Northern Goshawk:** 5,745 acres of available nesting habitat and 8,752 acres of available foraging habitat. **Pileated Woodpecker:** 5,745 acres of available nesting habitat and 7,381 acres of available foraging habitat. **Pine Marten:** 6,363 acres of available habitat. **Fisher:** 2,550 acres of available winter habitat **Flammulated Owl:** 350 acres of available habitat **Western Toad:** 7,000 acres of available habitat **Wolverine:** 600 acres of available habitat

Resource Issue	Comparison Summary of Effects
Alt 2	**Canada Lynx:** Timber harvest and precommercial thinning activities would affect 121 acres or 4.5% of available lynx habitat. **Elk Summer Range:** Elk habitat effectiveness decreases to 47%; Forage habitat increases to 9%; and Standard open-road density increases to 1.8 mi/mi^2 **Elk Winter Range:** Winter range < 25 years old increases to 7% **Northern Goshawk:** 50 acres (0.9%) of nesting habitat affected and 431 acres (4.9%) of foraging habitat affected. **Pileated Woodpecker:** 50 acres (0.9%) of nesting habitat affected and 954 acres (12.9%) of foraging habitat affected. **Pine Marten:** 433 acres (6.8%) of habitat affected. **Fisher:** 10 acres of available winter habitat affected **Flammulated Owl:** 35 acres of available habitat affected **Western Toad:** 130 acres of available habitat affected **Wolverine:** 28 acres of available habitat affected
Alt 3	**Canada Lynx:** Same as for Alternative 2. **Elk Summer Range:** Same as for Alternative 2. **Elk Winter Range:** Same as for Alternative 2. **Northern Goshawk:** 50 acres (0.9%) of nesting habitat affected and 379 acres (4.3%) of foraging habitat affected. **Pileated Woodpecker:** 50 acres (0.9%) of nesting habitat affected and 821 acres (11.1%) of foraging habitat affected. **Pine Marten:** 371 acres (5.8%) of habitat affected. **Fisher:** No acres of available habitat affected **Flammulated Owl:** No acres of available habitat affected **Western Toad:** 110 acres of available habitat affected **Wolverine:** 24 acres of available habitat affected
Sensitive Plants – Plants that may occur within the analysis area could be affected by proposed management activities.	
Alt 1 – No Action	There would be “no impact” to sensitive plants in the area.
Alts 2 and 3	For most species, the effects of these alternatives would be about the same, with Alternative 2 proposing more activities that transform habitat. For all sensitive plant species included in this analysis, the effects determination for each alternative would be “may impact individuals or habitat but not likely to cause trend towards federal listing or reduce viability for the population or species.”
Soil Stability and Landslide Hazard Potential – Proposed activities can cause surface erosion and/or mass wasting erosion events.	
Alt 1 – No Action	There would be no activities proposed on landtypes having high landslide hazard potential.
Alts 2 and 3	As reported in the revised DEIS, seven treatment units, totaling 326 gross acres, were proposed on landtypes having high landslide hazard potential. Since the implementation of Design Measure #3 during recent unit layout activities, all landslide prone areas have been eliminated from proposed treatment. Of the original 326 acres, only 16 acres remain, containing no landslide prone areas. Thus, soil stability and landslide hazard potential is no longer an issue with this project.

Resource Issue	Comparison Summary of Effects
Soil Productivity – There are areas with existing detrimental soil disturbance that could be affected by proposed activities.	
Alt 1 – No Action	No activities are proposed.
Alts 2 and 3	Three units (5, 10, and 13) would require specific design measures to keep DSD below the 15% for each unit and comply with the Regional soil standard (see design measures 6, 7 and 8).
Tribal Treaty Rights – Effects of activities on fishing, hunting, and gathering (roots and berries).	
Alt 1	There would be little to no impact on fishing, hunting, or gathering.
Alts 2 and 3	Proposed timber harvest would produce long-term improvements in forest health, which may benefit tribal hunting and gathering activities. Proposed watershed improvement activities may benefit tribal fishing over the long-term.
Watershed Condition – Proposed activities could affect equivalent clearcut area, road density, and sediment production.	
Alt 1 – No Action	Existing condition: ECAs range from 0.3 to 7% Sediment yield percent over natural conditions is within Forest Plan standards. Average road density = 6.1 mi/mi^2
Alts 2 and 3	ECAs range from 0.3 to 12%, which is within acceptable limits. Probability of sediment delivery is low (less than 10%) and within Forest Plan standards. Average road density = 3.6 mi/mi^2, a reduction of 2.5 mi/mi^2

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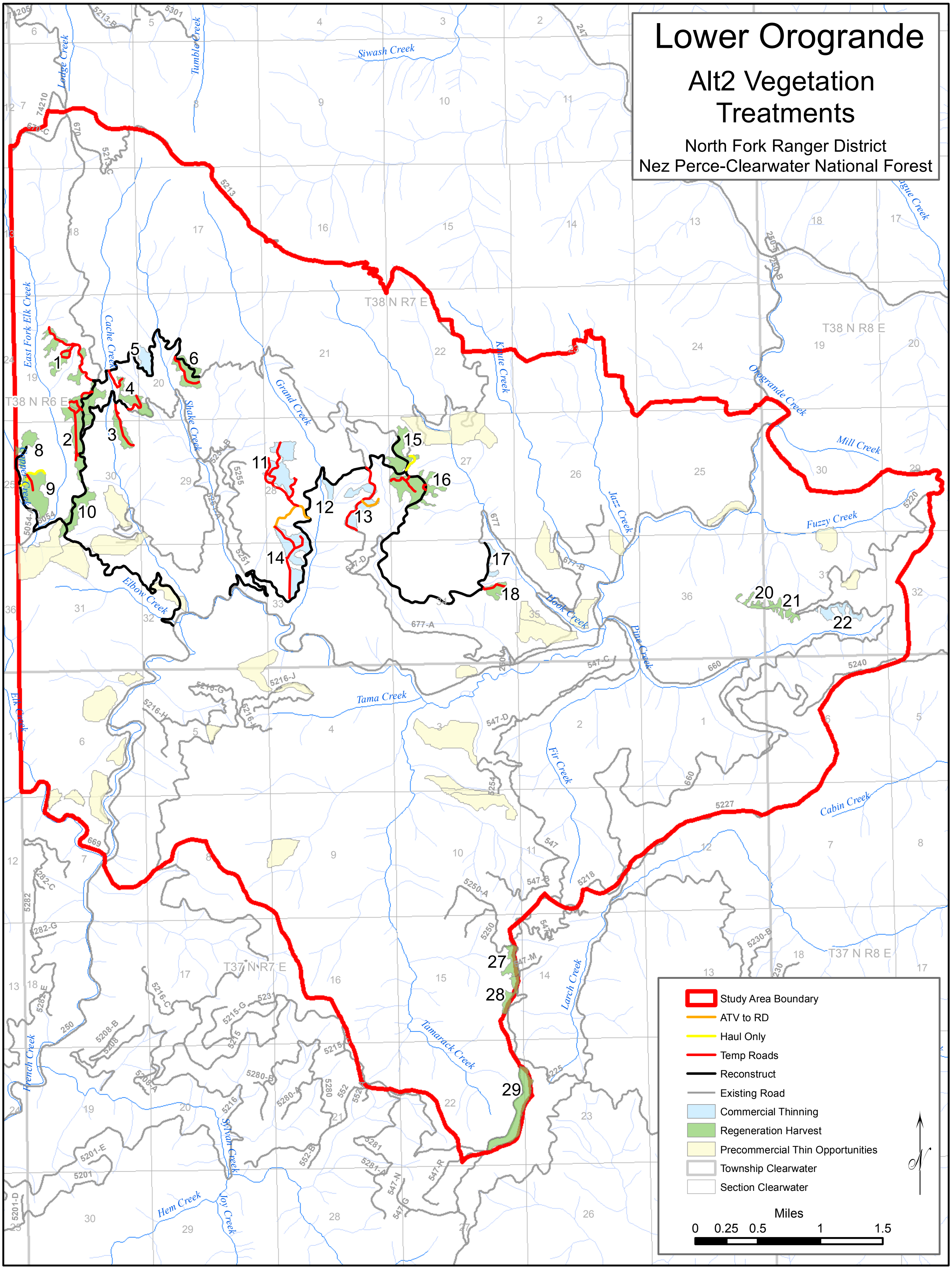

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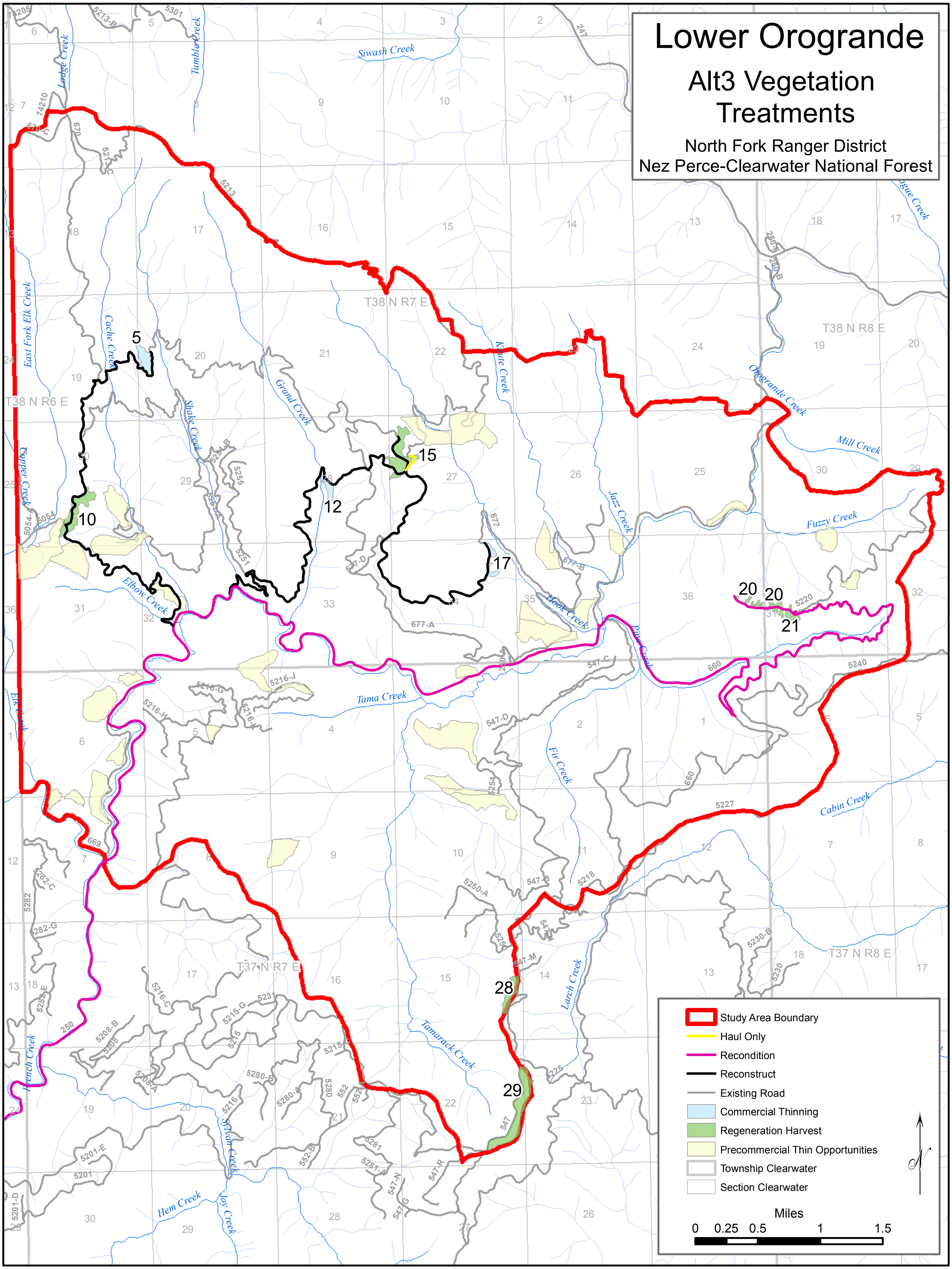

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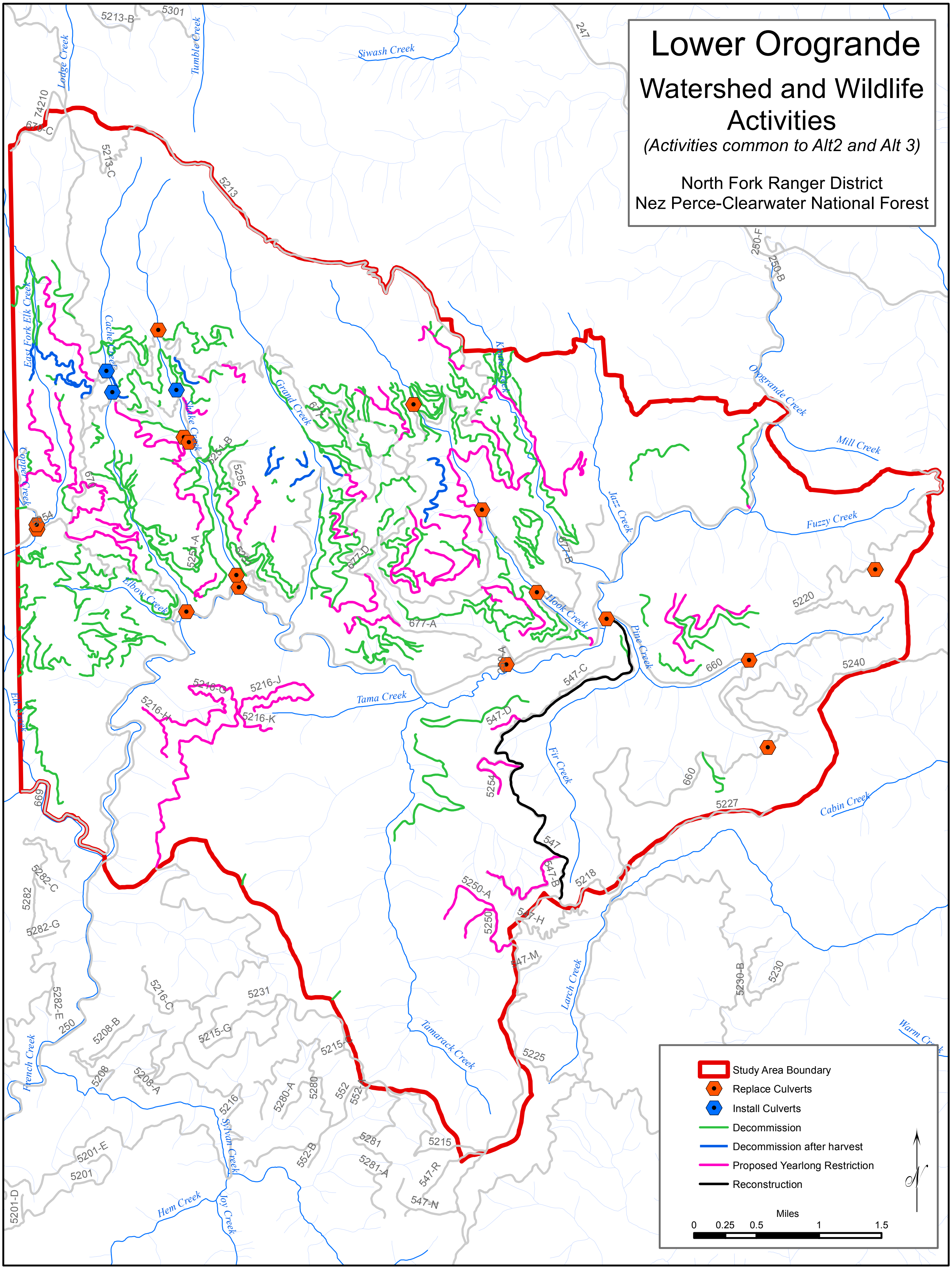

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CHAPTER 3
AFFECTED ENVIRONMENT

This chapter describes the baseline (existing) conditions against which environmental effects can be evaluated with the implementation of any of the action alternatives. Most of the environmental descriptions in this chapter reference specialist reports and technical data contained in the project file.

I. Soils (Ref: Lower Orogrande Soils Report)

Soils across the Lower Orogrande project area vary by slope, aspect, parent material, texture, depth, vegetative cover, and microclimate. The existing condition of the soils has been influenced by past disturbances from natural processes and management-related activities on the landscape. Past land management activities include timber harvest and associated road systems across the project area and some small areas of hard-rock mining. The area has seen 11,112 acres of regeneration harvest and 4,063 acres of intermediate harvest from 1960 to present. Approximately 224 miles of roads have been constructed in the project area.

A. Geology and General Soil Characteristics

The geologic parent material in the project area consists of Idaho Batholith granitics (30%), Border Zone metamorphic rocks (25%), Belt Series metasediments (19%), alluvial sediments (11%), and undifferentiated materials (11%). Idaho Batholith granitics generally dominate the northern half of the project area north of Orogrande Creek, with alluvial sediment parent material found in the eastern portion of the project area. Belt Series parent materials are distributed mostly along the Orogrande Creek and lower Pine Creek. Border Zone metamorphics are the most common parent material south and east of Orogrande Creek.

The Pine Creek and east side of lower Tamarack Creek areas are notable because of the inherent slope and soil instability due to the presence of micaceous schists and faulting (Wilson, 1992). A zone along Tamarack Ridge south of Tamarack Creek across Orogrande Creek to the Hook Creek and Jazz Creek area contains mostly non- to weakly- micaceous quartzites which are relatively stable compared to areas with strongly micaceous material. The Pine, Hook, and Jazz Creek areas have a long history of mass stability and erosion problems. However, the quartzites in the Hook and Jazz Creek areas are relatively stable, and the historic instability was due to improper road location and construction. Natural slump areas associated with stream incision and faulting occur throughout the area.

Volcanic ash deposited by wind after eruptions in the Cascade Range has greatly influenced the local landscape and soils. The most influential eruption was that of Mt. Mazama (~6,700 years ago) located in southwestern Oregon at Crater Lake. Soils weathered and developed from volcanic ash are fundamental to the overall high productivity of the project area due to very high infiltration rates and water-holding capacities compared to the coarser-grained soils weathered from bedrock parent materials. Most surface soils in the project area have similar characteristics including distinct , 12-24” deep volcanic Mazama ash-derived ashcaps with a silt loam texture over deep, moderate to well-weathered gravelly sandy loam to loam subsoil horizons. Ash deposits are very common in stable landscape settings while shallower soils with thinner or nonexistent ash deposits are limited to areas on southerly aspect breaklands, rock outcrops, or faulted areas such as those located south of Clarke Mtn. The presence of ash-derived soil as an intact layer with little mixing is an indication of relatively stable slopes and soils over the 6,700 years since deposition.

B. Landtypes and Landtype Associations

The effects of disturbances on soils depend on specific soil type, topographic setting and slope hydrology. Landforms have characteristic slope shape, steepness, and stream dissection, which affect soil stability, erosion processes and sediment delivery to streams. The primary ecological land units used to describe and evaluate the Lower Orogrande project are larger landtype associations (LTAs) and smaller landtypes (Wilson et al., 1983). These are small to mid-scale classification units of the Nationwide Hierarchical Framework of Ecological Units (Cleland et al. 1997) adopted by the Forest Service in 1993.

Landtype associations are defined by general topographic landforms, surficial geology, geomorphic processes, soil characteristics, potential natural vegetation communities and climatic conditions. Landtypes are delineated by similarities in soils, landforms, geologic parent materials and plant associations and have been mapped for the entire Clearwater National Forest (Wilson et al., 1983. Landtype associations are most suitable for analysis at the landscape-scale and are applied here to describe terrestrial characteristics such as landforms and disturbance processes for the project area. The description and distribution of LTAs and LTA group landform in the Lower Orogrande project area is as follows:

Low-relief rolling hills (29% of the project area) are gently rolling uplands areas. Slopes are generally flat to rolling (< 30% slope). High-density drainage patterns with low vertical relief characterize these areas. Soils are generally deep and developed through intense physical and chemical weathering, and often contain a +12" thick Mazama volcanic ash layer at the surface. Deep soils and gentle topography support some of the most productive sites on the Forest and in the current project area. Historic lethal fires were infrequent at 151-300 year intervals with more frequent, with non-lethal underburning occurred in isolated patches during normal years (50-150 year intervals).

Colluvial midslopes (29% of the project area) are transitional landforms between the steeper breaklands and the low-relief rolling hills and have slopes ranging from 30 to 60%. Ridges generally are convex and the sideslopes are straight. Soil creep, surface erosion, and mass wasting events are the dominant erosional processes. Fire disturbances are typically infrequent, mixed, lethal/non-lethal occurring every 76-150 years with patch sizes ranging up to 10 acres for non-lethal underburns and up to 500 acres for lethal burns.

Breaklands (28% of the project area) are characterized by steep slopes (generally greater than 60%), adjacent to actively downcutting streams or rivers. Mass wasting and other colluvial actions are the dominant erosional processes. These landforms are highly efficient at transporting sediment removed through erosional processes. The Mazama volcanic ash layer is frequently mixed or absent due to past erosional events, thus the presence of an ash-layer on this LTA indicates relatively stable areas. Fire disturbances are typically frequent, mixed, lethal/non-lethal burns occurring every 25 to 50 years. Burn patches range from less than an acre up to 200 or more acres, in a mosaic of burned and unburned areas.

Frost-churned ridges (8% of the project area) are found in upper slope, high elevation positions below zones of past glaciations and often above colluvial midslopes. Slopes are generally <40%. Frost action and other physical weathering are the dominant erosional processes, resulting in mixed soils with high rock content. Fire occurs as infrequent, lethal burns with intervals of 76 to 150 years on south aspects and 100 to 200 years on north aspects. Burn patches range from 100 to 500 acres on south aspects, and from 500 to 1000 acres on north aspects.

Mass wasted areas (3% of the project area) are landforms that have previously experienced large mass movement erosional events. They are generally found adjacent to breakland or colluvial midslope landforms, and have similar erosional and fire disturbance patterns as well as vegetation characteristics.

Stream Terraces (2% of the project area) are found in areas adjacent to streams and rivers. These areas have deep, well-sorted soils usually with high water tables. These landscapes are dominated by high density drainage patterns with low vertical relief. Slopes are generally less than 10%. Fire occurs as very infrequent, lethal burns with intervals ranging from 151 to 300+ years. Flooding and windthrow are the dominant disturbance processes in these areas.

Stream Bottoms (1% of the project area) include stream bottoms and meadows, as well as recent alluvial deposits from loess and basalts. This landform is important due to the unique characteristics found in wetland areas. This LTA includes complexes of well-drained areas and areas of periodically high water tables at lower elevations and with slopes from 0 to 10%. Fire disturbances are infrequent and greater than 300 years. On a stand basis, some non-lethal and some mixed burning occurs every 50-150 years.

C. Landtype Phases and Erosion Hazards

Landtype phases are the smallest ecological units recognized in the national ecological hierarchy (Cleland et al. 1997). They are based on topographic criteria (such as slope shape, steepness, aspect, position), hydrologic characteristics (including subsurface drainage, presence of springs, seeps, channels), soil properties, and plant associations and phases that that influence or reflect the microclimate and productivity of a site.

For the Lower Orogrande project, landtype phases are identified primarily to recognize high mass wasting and debris avalanche potentials in proposed treatment areas. High landslide hazard areas are often indicated by wetland areas and moist seeps situated on slopes. Hydrophytic vegetation, indicating saturated soil conditions during at least a portion of the year, identifies areas where water is concentrated and may have high landslide risks. Slopes in excess of 55% were identified by McClelland et al. (1997) as having an increased hazard for landslides. Past landslide locations may also be high risk areas for future slides.

D. Landtype Erosional Processes and Characteristics

Erosional events including landslides, debris flows, surface erosion, and other downslope movements of soil, wood or rock are natural processes that have occurred coincidentally with natural disturbances, primarily wildfire, for thousands of years (Wilson et al. 1983). The amount and severity of erosional events are dependent on disturbance intensity, landtype characteristics, and the vegetation communities present. More frequent, low and mixed severity wildfires typically result in less erosion than infrequent stand replacement fires.

On low-relief, rolling hill landforms on alluvial and granitic geologic parent material, erosion of the parent material erosion is most common. These events typically only occur when the overlying Mazama volcanic ash cap has been removed. Intense wildfires and subsequent erosion events have resulted in the partial or complete loss of the Mazama ash layer on steep landforms on the Clearwater National Forest, but that has not occurred in most of the Lower Orogrande analysis area, primarily due to the presence of the low- and moderate-relief landforms. Steep breakland landforms in the project area, particularly on south-aspect slopes, have areas where the ash cap has been partially or completely lost through erosional processes. Surface soils in these areas are mostly influenced by the more erodible and less productive properties of underlying border zone, Batholith granitics, and belt series parent material.

Surface erosion is most affected by the distribution of fine roots in the upper soil horizons and the presence of an intact duff/litter layer, while mass wasting potential is mostly influenced by the distribution of large tree roots in the entire rooting zone. Little evidence of accelerated surface erosion was observed within the Lower Orogrande area during field reviews except on some old skid trails, roads, and cut and fill slopes adjacent to roads. These areas of elevated surface erosion observed during field reviews were mostly limited to steep (>55% slope), south-aspect breakland areas in Pine Creek and lower Tamarack Creek.

Landtypes and landtype phases were analyzed to evaluate overall erosional characteristics in the project area and to assess site-specific erosion hazards. Landslide hazards, evaluated in terms of mass wasting and debris avalanche potentials, were determined for each landtype based on site characteristics and were calibrated based on actual landslide occurrence during 1974-1976 storm events. The following six erosional characteristics were evaluated for the landtypes within the analysis area (Wilson et al. 1983):

1) **Mass wasting potential** evaluates the relative potential for mass soil movement caused by gravitational forces. It involves the movement of regolith as a coherent mass along a slippage plane created due to subsurface water concentration. Landtype properties used to evaluate this potential are: a) slope gradient, b) presence of concentrated subsurface groundwater, c) substratum texture, d) regolith depth and e) presence of mica. The potential for mass wasting is low to moderate on 66% of the analysis area and high to very high on the remainder.

2) **Debris avalanche potential** evaluates the probability of rapid and usually sudden downslope movement of initially consolidated debris. The slippage plane is often hard bedrock and debris avalanches often turn into mudflows as they move down slope and accumulate soil material. Landtype properties used to evaluate this potential are: a) slope gradient, b) slope shape, c) topsoil texture and d) the occurrence of old slide scars and the accumulation of debris at the slope base. Debris avalanche potential is low to moderate on 98% of the analysis area, due to the presence of the Mazama ash layer.

3) **Surface erosion potential** considers raindrop splash and overland flow erosion on soils that have lost vegetation cover, but which retain the root mat and soil structure. This potential is used for predicting surface erosion following prescribed or natural fires. Landtype properties used to evaluate this potential are: a) volcanic ash topsoil characteristics, b) slope gradient, c) depth to restricting layers and d) slope shape. The presence of the Mazama volcanic ash cap plays an important role in surface erosion potential since this material is extremely permeable, has a high water holding capacity, and thus is seldom associated with overland flow. Surface erosion potential is low on 95% of the analysis area, due to the presence of the Mazama ash layer.

4) **Subsurface erosion potential** considers raindrop splash and overland flow where the subsoil has been exposed, or where the surface soil has been severely disturbed and mixed with the subsoil. This potential is used for predicting erosion occurring from shallow soil disturbance and displacement, such as road or skid trail excavation. Landtype properties used to evaluate this potential are: a) slope gradient, b) depth to restricting layers and c) subsoil texture. Subsurface erosion is low to moderate on 93% of the analysis area, due to generally deep and well-drained subsoils.

5) **Parent material erosion potential** considers raindrop splash and overland flow erosion that occur in deep excavations, including roads and skid trails. Landtype properties used to evaluate this potential include parent material characteristics such as: a) extent of bedrock weathering, b) rock fragment content and c) substratum permeability. Parent material erosion potential is low to moderate on 77% of the analysis area and high on the remainder.

6) **Sediment delivery efficiency** is the ability of a landtype to deliver sediment produced from on-site sources to streams. The delivery efficiency rating reflects the delivery of naturally produced sediment on slopes as well as the acceleration of mass movement through management activities. Landtype properties used to evaluate this potential are a) slope gradient, b) slope dissection and c) slope shape. Sediment delivery efficiency is high to very high on 62% of the analysis area and moderate on the remainder of the area.

E. Landslide Hazard Factors

During storm and flood events in 1995 and 1996, over 860 landslides occurred across the Clearwater National Forest. A survey was conducted to review these landslides and five factors (geologic parent material, slope angle, landform, aspect, and elevation) were identified to assess the inherent risk of landslides on the Clearwater National Forest (McClelland et al. 1997). The analysis was based upon an inventory of landslides that occurred on the Forest during storm events in the fall of 1995 and the winter/spring period of 1996. The information reported by McClelland was modified, based on corrections made to the landslide database (Clearwater National Forest 2000).

Geologic parent material, slope angle, and landform are generally considered the most important landslide factors. Elevation and aspect are more related to climatic conditions (whether the precipitation occurred as rain or snow) and the storm direction.

The geologic parent material in the Lower Orogrande project area consists of Idaho Batholith granitics (30%), Border Zone metamorphic rocks (25%), Belt Series metasediments (19%), alluvial sediments (11%), and undifferentiated materials (11%). Border Zone and Belt Series parent materials are associated with high landslide rates and assigned a high landslides hazard. Idaho Batholtih Granitics have a moderate landslide hazard, and alluvial sediments have a low landslide hazard. Undifferentiated parent materials have variable landslide risks and are considered moderately hazardous overall.

Slopes in the Lower Orogrande project area range from 2 – 85%. Based on landslide occurrence in 1995 – 1996, areas with slope angles of 0-35% have a low landslide hazard and account for 39% of the project area. Areas with 36-55% slopes have moderate landslide hazard and comprise 48% of the project area. Slope angles of 56% or greater have high lanslide hazard ratings and includes 13% of the project area.

Landforms also vary considerably across the project area and often reflect landslide hazard ratings similar to those based on slope for a given area since slope and landform are closely associated. Within the project area, high landslide hazards based on landform are found on breakland and mass wasted areas, which comprise 28% and 3% of the project area, respectively. The remaining landforms have low to moderate landslide hazard ratings.

In the 1995 and 1996 high precipitation storm events, 75 landslides occurred in the Lower Orogrande project area, with 68 of them originating from roads; six slides originating from regeneration harvest units; and one landslide resulting from natural-causes. Major erosion and mass wasting events, such as these, will likely continue to occur in the Lower Orogrande area and shape its landscape for today and into the future.

F. Soil Productivity

Soil productivity is defined as the inherent capacity of the soil resource, including the physical, chemical, and biological components, to support resource management objectives. It includes the growth of specific plants, plant communities, or a sequence of plant communities (FSM 2550). Site productivity is the species-specific response to the entire ecosystem. Site productivity includes all the ecosystem processes, including the effect of climatic, physiographic, and vegetative characteristics of a specific site as well as the soil.

Past natural and management activities have impacted the existing productivity of the soils in the Lower Orogrande project area. Approximately 15,175 acres of the project area has had past intermediate or regeneration harvest, and approximately 60 acres has experienced mining operation activities. Approximately 924 acres of the project area is occupied by roads and is in an unproductive state.

1. Compaction, Displacement and Productivity

Soil compaction can result from the use of mechanized equipment during harvest practices and often leads to a decrease in total porosity and increased soil strength and volumetric water content, which can result in increased water runoff and soil erosion, less rooting volume, and poor aeration (Curran et al. 2005; Page-Dumroese et al. 2006a, Greacen et al. 1980). The effects of compaction on soil properties can lead to decreased plant growth and soil productivity (Powers 1991, Froehlich et al. 1986)

Researchers have also found the detrimental effects of compaction on productivity to be variable in duration and extent, and dependent on soil texture and other site specific factors affecting air and water balance in the soil (Curran et al. 2005; Powers et al. 2004; Page-Dumroese et al. 2006b; Froehlich et al. 1985; Flemming et al. 2006). Surface layers to a depth of several centimeters generally recover to undisturbed bulk densities faster than the subsurface layers, but the effects of compaction can last for decades (Froehlich et al. 1985). Recovery after soil compaction can occur from a variety of physical and biological processes. Physical recovery processes include freeze-thaw and wetting-drying cycles which are very site-specific. Biological recovery of soils affected by compaction is dependent on the activity of roots and soil organisms. Soil decompaction would enhance the decomposition activity of soil microorganisms by improving water and gas infiltration.

Surface soil loss through displacement and mixing with less productive substrata decreases soil productivity. This occurs during temporary road construction, excavation of skid trails and landings, and displacement of soils during ground based harvest. The loss of the Mazama ash cap layer, which exists over much of the Lower Orogrande project area, would reduce the water-holding capacity and increase the overall soil bulk density. These effects would decrease available soil moisture and tree root penetrability. Since volcanic ash is not replaced, the effects of erosional losses of the ash cap would be long-term.

2. Organic Matter and Productivity

Soil organic matter is fundamentally important to sustaining soil productivity (Powers *et al.* 2005; Powers 2002). Soil organic matter is influenced by fire, silviculture activities, and decomposition and accumulation rates. The organic component of soil is a large reserve of nutrients and carbon and is the primary site for microbial activity. Forest soil organic matter influences many critical ecosystem processes, including the formation of soil structure. Soil structure influences soil gas exchange, water infiltration rates and water-holding capacity. Soil organic matter is also the primary location for nutrient recycling and humus formation which enhances soil cat ion exchange capacity and overall fertility.

Soil organic matter depends on inputs of biomass (e.g. vegetative litter, fine and coarse woody debris) to build and maintain the surface soil horizons, support soil biota, enhance moisture-holding capacity, and prevent surface erosion. Woody debris in the form of slash provides a practical and effective mitigation for reducing harvest impacts on soil physical function and processes. The retention of coarse (> 3" diameter) woody debris is essential to maintaining soil organic matter, soil productivity and sustainable forest ecosystems (Graham et al. 1994).

Soil disturbance field reviews for the Lower Orogrande project documented few instances of detrimental soil disturbance on areas not directly impacted by road effects. Previous harvest in the Lower Orogrande project area occurred primarily with ground-based equipment in the 60s and 70s. Assuming soils in these previously harvested areas were subject to some degree of compaction, displacement and extensive vegetation removal, these observations indicate that recovery processes have occurred in many areas over the past 40-50 years. Recovery will likely continue if fundamental soil properties are maintained or enhanced during management activities.

G. Past Activities

The existing soil condition in the Lower Orogrande project area has been affected by past natural processes and management activities. Past management activities that have affected soils in the Lower Orogrande project area include timber harvest (1960s-2000s), road construction and maintenance, recreation, fire and mining activities. Past timber harvest and associated road construction have had the most substantial and widespread impacts on the soils in the project area.

Timber Harvest: Records indicate that 70% (15,175 acres) of the project area has been involved in regeneration (11,112 acres) or intermediate (4,063) harvest since the1960s. The majority of the harvest (68%) occurred in the 1960s and 1970s. Harvesting methods during this period typically involved hand-felling of trees, ground-based skidding, and mechanical slash piling and site preparation before replanting. These earlier harvest practices utilized ground-based equipment on steep slopes (>35%) and often involved the use of closely–spaced, stacked jammer roads on steep hillslopes. Burning for site preparation was often less-refined and controlled and likely resulted in more frequent and widespread losses of the soil duff layer, organic matter and desirable chemical, physical, and biological soil properties. Substantial soil compaction, displacement, erosion and loss of organic matter often resulted from these earlier harvest techniques.

Harvest practices have changed considerably in recent decades, and have generally resulted in decreased harvest-related impacts to soils. Project design measures, BMPs, and Forest Plan guidelines are used to reduce the extent of disturbance and maintain soil productivity. Ground-based systems are mostly limited to slopes <35%, and the use of skyline logging on slopes >35% is now common. The contemporary use of forwarding systems, often in conjunction with cut-to-length harvesters, precludes skidding logs on the ground and provides a slash-mat on machine trails which decrease erosion and soil displacement.

Fire: Approximately 690 acres of wildfire has been documented in the project area, from 1919 through 1989. Soil field surveys found evidence of past fire (e.g. charcoal, charred stumps).

Roads: In the Lower Orogrande project area, approximately 224 miles (approx. 924 acres; 130 mi. system; 94 mi. non-system roads) exist where topsoil and subsoil have been displaced, mixed, compacted or lost to erosion. Although system roads are excluded in the determination of whether projects meet Forest Plan and Regional standards, they are a part of the existing condition. To date, over 34 miles of roads have been decommissioned in the project area.

Mining: This activity has occurred in the project area, mostly from 1900 through the 1940s. The most notable activity was near the western boundary of the project area near the site of the old Oxford Mine, where copper and gold mining occurred. Mining trenches, adits, and tailings piles exist in this 60-acre area. Soils here have been severely displaced and detrimentally disturbed. Surface soils and rock may also contain hazardous elements excavated through the mining operations.

Recreation: Effects on soils from recreation activities are mostly associated with full size vehicles and OHVs using authorized roads, trails and dispersed camping areas. Detrimental impacts on soils have occurred in the past from OHV use on undesignated routes or user-created routes, through sensitive soils and riparian areas, on steep hillslopes, and on closed roads. Unauthorized dispersed camping and off-route OHV use, especially in riparian areas, often results in adverse effects on soils through the removal of vegetation, compaction, and erosion.

II. Watershed (Ref: Lower Orogrande Project Watershed Report)

A. Watershed Descriptions

Orogrande Creek contains nine smaller subwatersheds that are 7th field HUCs (hydrologic unit codes). Table 3.1 displays the existing general conditions of several indicators. Harvest, road, and equivalent clearcut acre (ECA) calculations are for National Forest System lands. Equivalent clearcut acre is only affected by stands younger than 25 years old. A Google Earth review shows that most of the adjacent lands have gentler slopes than the project area. They are well vegetated with young (estimated 30-50 year old) trees, roads appear to be grown over in most locations, and there are no visible landslides associated with them.

Table 3.1 - Existing Condition Information

	Watershed Acres	Past FS Harvest Acres (% of subwatershed since 1970)*		Miles of Road	Road Density (mi/mi^2)	ECA
		Regeneration	Intermediate			
6th Code Watershed						
Lower Orogrande Creek	27,000 (23,600 are FS lands)	3,677 (16%)	3,151 (13%)	224	6.1	5%
7th Code Subwatersheds						
Orogrande-Elk Creek (4% FS lands)	2,440 (92 are FS lands)	28 (30%)	40 (43%)	2	14.2	0.3%
East Fork Elk Creek (68% FS lands)	1,959 (1,350 are FS lands)	0	0	15	7.1	3%
Elk Creek (41% FS lands)	666 (270 are FS lands)	0	0	3	7.1	2%

	Watershed Acres	Past Harvest Acres (% of subwatershed since 1970)*		Miles of Road	Road Density (mi/mi^2)	ECA
		Regeneration	Intermediate			
Orogrande Creek - Tamarack Creek (100% FS lands)	6,830	1,297 (19%)	1,522 (22%)	94	8.7	7%
Shake Creek (100% FS lands)	1,754	128 (7%)	0	23	8.5	5%
Tamarack Creek (100% FS lands)	3,600	1,030 (29%)	441 (12%)	14	2.5	2%
Hook Creek (100% FS lands)	1,583	205 (13%)	96 (6%)	25	10	7%
Orogrande Creek - Jazz Creek (100% FS lands)	5,149	365 (7%)	286 (6%)	19	2.4	3%
Pine Creek (100% FS lands)	3,030	625 (21%)	764 (25%)	29	6.2	6%

* Timber harvest before 1970 does not count toward ECA calculations because ECA is only affected by stands younger than 25 years old.

Stream channels in the area range from relatively steep and confined headwater channels (Rosgen A), to lower gradient Rosgen B channels. Orogrande Creek itself is a relatively flat and very wide Rosgen C type channel (Rosgen 1996). Field surveys indicate that perennial and intermittent channels within or adjacent to harvest and burn units are Rosgen A or B channel types and steep (greater than 5%). Channels are primarily stable due to well established streambank vegetation, are not entrenched, and are fully accessible to their floodplains. Channel substrate consists of cobbles, gravel, and sand. There is little evidence of downcutting in streams.

Beneficial uses and water quality criteria and standards are identified in the State of Idaho Water Quality Standards and Wastewater Treatment Requirements (IDAPA 58.01.02). Beneficial uses for Orogrande Creek were not designated. For those streams with no specific designation, cold water aquatic life and secondary contact recreation are applied. The two factors that have the greatest potential to impact aquatic life are sediment and temperature. The Idaho State standards that would be followed for the project are:

- ***Sediment***: “Sediment shall not exceed quantities ...which impair beneficial uses.” (IDAPA 16.01.02200,08.).
- ***Turbidity***: The turbidity standard allows for an increase over background of no more than 25 nephelometric turbidity units (ntu's) for a period of 10 days, and no more than 50 ntu's, instantaneous, over background (IDAPA 16.01.02250, 02.c.iv.).
- ***Cold Water Biota***: Water temperatures of 22 degrees C. or less with a maximum daily average not greater than 19 degrees C. (IDAPA 16.01.02250,02.c.ii.).

The only water rights decreed in the project area are assigned to the Department of Agriculture (US Forest Service). There are no other water rights applications, permits, decrees, licenses, claims, or transfers located in the project area (Idaho Department of Water Resources website - www.idwr.idaho.gov/apps). There are no municipal watersheds or Source Water Protection areas located within the project area.

B. Past Activities

Conditions in the project area are a result of both natural processes and human activities. Past human related activities that affected water or sediment yield include road building and maintenance, and previous harvest activities (1950s to 2005). Timber harvest prior to 1995 (pre-INFISH) did not retain large buffers and many roads were built near streams or used construction techniques that increased the risk of sediment entering streams. Roads were often built with inadequate drainage or with ditches that drained directly into steam channels. The result could lead to increases in both water and sediment yield. Harvest activities since 1970 range from 0 to 73 percent of their respective subwatersheds (see Table 3.2). Orogrande-Elk Creek is high (73%) only because the Forest Service acres are small within the subwatershed.

Water Yield: Compaction, disturbance, or removal of the ground surface and vegetation growth can increase water yield. Water yield refers to stream flow quantity and timing and is of concern, since stream flow is a key determinant of the energy available for erosion, transport, and deposition of sediment within channels. Increased water yields may be associated with channel scour, bedload movement, or redistribution of sediment in depositional areas.

Water yield generally increases after vegetative treatments due to a reduction in transpiration and precipitation interception losses. Removal of forest canopy can also affect snow accumulation and melt processes, often resulting in an increase in snowpack accumulation and melt rates, thereby increasing runoff rate and volume. Roads and skid trails typically increase overland flow due to soil compaction. They also have effects similar to timber harvesting due to forest canopy removal.

Equivalent Clearcut Area (ECA) is often used as an indicator of water yield and represents the amount of forest canopy openings in the watershed. Existing roads are considered as permanent openings when estimating ECA.

The ECA analysis using treatment and recovery coefficients from Ager and Clifton (2005) was used to determine the existing ECA condition. Past harvest and roads were included in the analysis. Existing ECAs for the subwatersheds analyzed range from 0.3 to 7% (Table 3.2). The estimated ECA in 6 of the 9 subwatersheds is due solely to roads. Of the remaining 3 (Orogrande-Tamarack, Tamarack, and Pine), 82, 84, and 95% of ECA is caused by roads, respectively. The current ECA for all subwatersheds is well within the acceptable limit of less than 20%. ECAs of less than 15% indicate high (good) condition and 15-30% indicates a moderate condition (NOAA, 1998). All Lower Orogrande subwatersheds are considered to have a good watershed condition rating based on ECA.

Sediment Yield: Active erosion of the landscape yields sediment to streams and occurs naturally or as the result of management activities. Sediment routing considers the arrangement of sediment within the watershed system and includes upslope and instream components.

Table 3.2 displays Clearwater Forest Plan, Appendix K standards (1987) and sediment yield percent over natural conditions (Jones and Murphy, 1997). The three subwatersheds presented are the only ones in the project area that have more stringent Forest Plan sediment yield standards. The remaining watersheds must meet the “basic” standard, where the beneficial uses must be identified and criteria to protect them specified. The beneficial uses were discussed above and design measures to protect them are found in Chapter 2 under the Mitigation and Design Measures section. The determination of percent over natural is based on modeling of the subwatersheds. All three subwatersheds meet the

Forest Plan sediment yield standard. Cobble embeddedness levels are measured in the field as an indicator of sediment levels and are used in combination with sediment yield to determine if desired conditions are being met. Orogrande Creek mainstem was not modeled for sediment yield, as the watershed is too large for the model. Field surveys indicate it meets desired cobble embeddedness levels based on actual stream survey data (see Fisheries section). Since none of the project area tributary streams meet the desired condition for embeddedness, the Forest Plan Stipulation Agreement of creating no measureable increase in sediment has been applied to this project.

Table 3.2 – Sediment Yield (WATBAL derived) Information*

Subwatershed 6th field HUC	Forest Plan Watershed	Forest Plan standard, Appendix K	Sediment Yield Percent Over Natural		Meets FP standard, Appendix K
			Forest Plan standard, Appendix K	Existing condition (1997)	
Lower Orogrande Creek	Orogrande Creek below French Creek	B channel type, Low fish	225% over natural	Not modeled**	Yes- based on cobble embeddedness levels
Tamarack Creek	Tamarack Creek	B channel type, High fish	55% over natural	40%	Yes
Pine Creek	Pine Creek	A channel type Low fish	250% over natural	47%	Yes

*Clearwater National Forest, Watershed Condition Report (Jones and Murphy 1997)
** The Orogrande drainage was not modeled in the 1997 report. Actual stream survey data was used to determine whether or not the stream meets Forest Plan Appendix K objectives. Lower Orogrande met objectives based on cobble embeddedness survey data which is more accurate than modeled data.

Road Density: The primary source of excess sediment is roads. Cutslope slumping and bare soils can be a chronic source of sediment input to streams. Roadside areas within the project area typically well vegetated and are filtering sediment so that it doesn't reach streams. Old jammer roads are grown over with trees and grasses and very few are contributing sediment. Road fill over several of the streams crossings on these roads was gone due to partial crossing failures in the past. Most are now stable and not contributing sediment; however there is still a risk that the remainder of the fill could be washed into the creek during a large stream flow event.

Forest roads open to the public are generally surfaced with gravel and show little signs of erosion. The greatest risk for sediment input from these roads is where the roadside ditches drain directly into perennial stream channels. Applying sediment reduction measures, such as the addition of culverts that drain ditchline water and sediment onto the forest floor where needed, can alleviate this issue. Clark Mountain Trail 604 has numerous stream crossings, most of which are hardened to limit erosion. Eleven of the 30 perennial crossing reviewed on this trail required additional work to minimize sediment input. The work would include the installation of material to better harden the approaches leading into the water. For the most part, the trail is in good condition from a sediment input perspective.

There are approximately 2 to 94 miles of open and closed roads in the subwatersheds analyzed, representing road densities from 2.5 to 14.2 mi/mi^2 (Table 3.2). The overall road density for the project area is 6.1 mi/mi^2. Watershed condition ratings based on road densities indicate that only the Tamarack and Orogrande-Jazz subwatersheds are in a moderate condition. All others are rated as poor based on road density. A watershed in high (good) condition generally has a road density of < 1 mi/mi^2. Watersheds with 1 to 3 mi/mi^2 are rated as moderate and >3 mi/mi^2 are rated as low (poor) condition (NOAA 1998).

III. Fisheries (Ref: Lower Orogrande Project Aquatic Habitat/Fisheries Report)

A. Stream Channels and Aquatic Habitats

Stream habitat and fish surveys were conducted for tributaries on the north side of the mainstem Orogrande in 1995 (Clearwater Biostudies, Inc.). The mainstem Orogrande, Tamarack, and Pine Creeks were surveyed in 1997 (Clearwater Biostudies, Inc.). Information collected includes physical data (stream type, habitat types, substrate, woody material, and cobble embeddedness) and biological data (fish species, distribution, and densities). The information was used to describe the existing aquatic condition. Data for the northern tributaries is thought to be relatively accurate, except in Hook Creek where six road-related landslides occurred during the 1995/1996 flood events. Sediment levels here could have either decreased due to steam flushing or increased due to the slides. Data for the mainstem Orogrande, Pine and Tamarack Creeks is likely similar to or improved over 1997conditions, since little land management, and no flood or fire events, have occurred since then. There have been 260 acres (9%) of intermediate and 180 acres (5%) of regeneration harvest in these drainages since 1997. Timber harvest since 1995 retained INFISH buffers and therefore would have no effect on instream habitat. It is assumed, based on information collected throughout the North Fork Clearwater drainage (CNF, 2005; pgs. Riparian Areas 7 thru 11), that streams in the analysis area are either being maintained or are on improving trends due to a lack of activities in riparian areas and RHCAs over the last 14 years.

There are a minimum of 130 miles of stream in the project area, 86 miles are high gradient, non-fish bearing streams and the remaining 44 miles are lower gradient and provide habitat for fish. All fish bearing, plus several non-fish bearing streams, have been surveyed (Clearwater Biostudies, 1995, 1997). The steep channel types (Rosgen A) make up 44 percent of all surveyed streams in the analysis area. Moderately steep (B type) make up 40% and the more sensitive C types make up the remaining 16%. Stream gradients within the analysis are moderate with an overall average gradient of 9% and an average range of 1-18%.

Riparian areas are dominated by cedar, spruce, subalpine fir, grand fir and to a lesser amount hemlock, Douglas-fir, white pine, and larch. Trees are generally greater than 30 years old with many well over 50 years. The understory of all streams includes alder, dogwood, willow, maple, and grasses. The alder, shrub and grass components provide overhead cover along streams and help to regulate stream temperature. Their roots also provide for bank stability, which is rated as excellent throughout area streams.

Cobble embeddedness levels are higher than desired in most area streams. The only stream that meets Forest Plan desired conditions of 35% or less is the mainstem of Orogrande Creek which has levels between 22% and 28%. The remaining stream averages range between 41% and 65%. High levels are often associated with land management activities, but they can also occur due to natural channel type or gradient.

Instream and riparian wood levels are well below Forest Plan desired conditions except for Shake and Jazz Creeks. Low wood levels can result from management activities such as timber harvest and road building, or from natural events such as ice dam buildups and releases or wildfires. Road related landslides which relocated wood within the stream channels occurred in the Jazz and Pine Creek subwatersheds during the 1995/96 flood events. Wood was also moved out of the systems resulting in lower than desired levels.

Pool quality is poor to fair throughout the analysis area. Pool quality is based primarily on stream depth and wood levels. Since wood levels are low, pool quality is also low. While pools are preferred rearing habitats for fish, riffle dominated systems such as those in the analysis area offer habitat in the form of large boulders and cobbles. Fish densities are relatively high in the analysis area indicating that adequate habitat is available. Both instream and bank cover are rated as good throughout area streams. These ratings represent good vegetative cover along stream banks and the presence of turbulence caused by boulder and cobble substrates.

Stream temperatures exceeded State cutthroat trout spawning temperature standards in streams throughout the area. Temperature data was available for 7 to 9 years on Orogrande, Pine, and Tamarack Creeks. Data was collected for only one year (2003) for several of the smaller drainages. Though temperatures fluctuate annually with weather patterns, the 7-day average maximum consistently ranged from 7 to 17°C throughout the summer. State standards for cutthroat trout are 13°. All streams met the State standard for cold-water biota; water temperatures did not exceed the daily maximum of 22°C or the maximum daily average of 19°C. Trout typically start becoming temperature stressed at 18°C. Lethal temperatures occur at 23°C.

The Forest Plan desired stream temperature condition is met for streams with both the Cutthroat Low and High Fishable standard.

The State TMDL identified temperature targets for streams in the project area. The goal is to attain 70-100% canopy over streams, including the mainstem of Orogrande Creek. Tributary streams have good canopy cover due to the presence of shrubs and trees. As trees continue to grow and trees remain unharvested adjacent to the stream, they would meet TMDL targets in time. A Google Earth review shows that all streams are well vegetated with the exception of small portions of upper Cottonwood and Hook Creeks. The mainstem of Orogrande Creek would not likely achieve the target of 100% due to its large width (50'average), and the treeless meadow along 1.5 miles of the stream. The presence of Forest Road 250 also restricts tree growth on one side of the stream for 6.5 of its 10 miles within the project area.

B. Aquatic Species

Stream gradients affect the movement of substrate and woody material which effects aquatic habitat development. Habitat availability in turn affects the presence or absence of local fish species. Cutthroat trout can be found in low to moderate gradient habitats (3-10%) that are interspersed in high gradient headwater streams of <20 %. Rainbow trout can be found in the low and middle reaches of large streams and tributaries where gradients are low to moderate (<10%). The existence of a natural falls on lower Orogrande Creek is thought to be a partial barrier to upstream fish passage.

Surveys indicate that Orogrande Creek and all of its tributaries except Fuzzy, Grand and Jazz Creeks support populations of westslope cutthroat trout. Cutthroat have the widest distribution of all fish species within project area. Densities are strong (Reiman and Apperson, 1989) throughout most of the tributaries including those with high cobble embeddedness levels. Cobble embeddedness does not seem to be limiting cutthroat production in these drainages. The lowest densities are found in the mainstem of Orogrande Creek. Cutthroat are the only species found in Cache, Shake, Knute, and Tamarack Creeks. Westslope cutthroat are a designated Regional Foresters Sensitive Species.

Resident rainbow trout occur within the Orogrande watershed. Densities are very low and are concentrated in just Hook, Pine, Fir and the mainstem of Orogrande Creek.

Brook trout are a non-native fish that was introduced to the area in the early 1900s. Brook trout do well in degraded habitats with high sediment levels and warm water temperatures. They have been observed on the Orogrande mainstem and in Cottonwood and Hook Creeks in very low densities. Higher densities are found in Elk Creek.

Bull trout occur in extremely low densities due to the falls on lower Orogrande Creek. One bull trout was found by Idaho Fish and Game in French Creek in French Creek (upstream from the analysis area) in 2005. Habitat for bull trout is limited by warm stream temperatures that are not conducive to bull trout survival. The few fish found may seek refuge downstream in the North Fork or upstream in French Creek where water temperatures are cooler.

C. Past Disturbances

Timber harvest information is summarized by 7th field HUC in the Hydrology report so that information will not be repeated here. Regeneration (clearcut) harvest has occurred on 16% of the project area. Intermediate (thinning) harvest has occurred on 13%.

During high precipitation storm events in 1995 and 1996, 75 landslides were observed (McClelland, 1997) in the Orogrande Creek area. The sources of these landslides were as follows: system roads (64%) and jammer roads (28%); regeneration timber harvest sites (8%); and one natural (<1%). Most occurred in Pine and Jazz Creeks. Thirty-four miles of roads in these two watersheds were decommissioned as a result of the flood events.

Because of the high rates of past road related landslides and geology in Orogrande Creek the potential exists for more failures and further degradation of aquatic habitat from landslides from old un-needed/un-maintained roads.

Roads: The project area has been extensively roaded in the past. Currently there are 224 miles of road, 130 miles of which are system roads and 94 miles of non-system jammer roads. The most significant effects that may have occurred as a result of roads include increases in water yield, erosion and stream sedimentation through surface erosion and mass wasting, and increases in water temperature.

There are a minimum of 4,400 acres of RHCA buffers on fish bearing streams and 5,000 acres on non-fish bearing streams within the project area. There are 36 miles of roads within fish bearing and 22 miles within non-fish bearing buffers. Roads within 150' of streams can contribute to the loss of riparian vegetation which is essential for aquatic habitat development (large wood) and protection of stream temperatures (FEMAT, 1993). Vegetation growth is excluded from the road surface and to some extent along the cut slopes of the road. Given that roughly 4 acres of land are removed from vegetation production per mile of road, a total of 232 acres (2%) of forest has been removed from all RCHAs. Roads within the project area that are not open to vehicle traffic are well vegetated and show no signs of surface erosion or delivery to streams. Many of their crossing structures are undersized and need maintenance to reduce the risk of failure. Others, particularly on jammer roads, have partially failed leaving additional fill that could be delivered to streams during a high flow event.

There is about a two mile section of Road 660 that lies on an unstable landtype. About 100 feet of this road failed in the recent past and continues to be a maintenance challenge. The original failure contributed large volumes of sediment to a Pine Creek tributary. It is highly likely that this site will fail again. The remaining portion of this road proposed for decommissioning, while currently stable, occurs on the same land type and is at high risk for future failure. There are 10 culverts than drain small perennial streams along this section of road. Failures at any one of these sites would add large quantities of unwanted sediment into Pine Creek.

Aquatic Organism Passage: There are about 310 stream crossings within the project area. Forty occur on fish bearing streams and of those, 30 are known or possible barriers to upstream fish movement. They currently restrict or prevent access to 11.5 miles of fish bearing streams. All are undersized which may result in future failure as they age or are inundated by a large flow event.

D. Management Direction

The **Riparian Management Objectives** as defined by PACFISH (1995) include bank stability, width:depth ratio, instream large woody debris, pool frequency, and water temperature.

Project area streams meet bank stability. Width to depth ratios vary, with some streams meeting and others not meeting desired conditions. Large wood objectives are not met. Pool frequency and water quality temperature objectives are also not met. Low pool frequencies are a result of low levels of instream wood.

The **Forest Plan** (1987) sediment loading standards for streams in the Lower Orogrande drainage can be found in Appendix K of the Forest Plan. All streams within the drainage meet the sediment loading standard (CNF, 1997); however all but the mainstem of Lower Orogrande do not meet desired cobble embeddedness levels of 35% or less. The Lower Orogrande project has therefore been designed to meet the Lawsuit Settlement Agreement (1993) of "no measurable increase in sediment".

IV. Wildlife (Ref: Lower Orogrande MIS & TES Wildlife Resources Status Report)

As stated in the EIS for the Clearwater National Forest Plan (Sept. 1987), the Forest supports over 350 different species of wildlife. Since the number of species precludes special considerations of each one, wildlife species were grouped according to their similar biological requirements. One or more species for each group, called management indicator species (MIS), was selected to represent the other species within the group. Indicator species were selected because changes in their populations and preferred habitats are thought to represent most of the parameters that would be important to other wildlife species.

Suitable habitat for each MIS was described based on Forest Plan direction, the conditions of existing vegetation, and other relevant habitat attributes. Suitable habitat for elk, moose, white-tailed deer, and belted kingfisher were qualitatively described based on reconnaissance of the analysis area. Additional quantitative analysis was conducted to determine elk habitat effectiveness, using the current interagency guidelines (Servheen et al. 1997).

Other species considered in this section include species that are federally listed as threatened or endangered and those on the Northern Region Sensitive Species List. The Northern Region Sensitive Species List, which contains those species identified as sensitive by the Regional Forester, was last updated on February 25, 2011 (to become effective on May 27, 2011). This section considers those sensitive species on the list that are known or suspected to occur on the Clearwater National Forest, in addition to the following changes:

- The bald eagle was removed from the list of threatened species on July 9, 2007 (USFWS 2007c) and is no longer shown on the list of threatened and endangered species. The bald eagle continues to be protected under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. It should now be addressed as a sensitive species (as it is in this section) for a minimum of five years; however, it has not yet been formally added to the Northern Region Sensitive Species List.

- The northern goshawk was removed from the Northern Region Sensitive Species List on July 17, 2007 because data collection and analysis by the Region indicated that there is not a significant current or predicted downward trend in population numbers or density, nor is there a downward trend in habitat capability that would reduce distribution of the species. The northern goshawk is a management indicator species on the Clearwater National Forest.

- The Northern Rocky Mountain gray wolf was relisted under the Endangered Species Act on August 5, 2010, when U.S. District Judge Malloy ruled that wolf populations in Montana and Idaho cannot be considered separate from Wyoming. However, the gray wolf has once again been removed from the Endangered Species List by an Act of Congress on May 5, 2011, and is now considered a sensitive species per Forest Service policy.

The analysis of available habitat and effects was based on the capability of the project area to support suitable habitat for each wildlife species. Species whose habitat was determined to either be not present (based on typical habitat attributes for the given species) or unaffected by the proposed actions were considered and dropped from further discussion. Species for whom habitat attributes were present in the analysis area were considered present and using the habitat. The following table lists all species applicable to the Clearwater National Forest and their occurrence within the Lower Orogrande analysis area:

Table 3.3 - Status, Occurrence, and Habitat of MIS/TES Wildlife Species

Species	Status	Occurrence	Comments
Bald Eagle	Sensitive	Unlikely/incidental	"No impact"; no activities proposed in suitable habitats.
Canada Lynx	Threatened	Presence is very rare or transient	"May affect"; project analysis area not within lynx analysis unit.
Gray Wolf	Sensitive	Present	"Not likely to jeopardize the continued existence" of wolves. Denning and rendezvous habitat would not be affected.
Belted Kingfisher	MIS	Present in suitable habitats	This specie would not be affected, since no activities are proposed in suitable habitats.
Elk	MIS	Present	Current use is low to negligible throughout the analysis area.
Northern Goshawk	MIS	May occur in suitable habitats	Suitable habitat exists outside of the old growth habitat used by this species.
Pileated Woodpecker	MIS	Present	Suitable habitat exists outside of the old growth habitat used by this species.
Moose	MIS	Present in suitable habitats	Management practices that benefit or impact elk have similar effects to moose, and need not be discussed or analyzed separately.
White-tailed Deer	MIS on the Palouse District only.	Present	Management practices that benefit or impact elk have similar effects to deer.
Black-backed woodpecker	Sensitive	No confirmed sightings within the analysis area	The implementation of snag habitat guidelines and the avoidance of suitable habitat should cause "no impact" to this specie.
Coeur d'Alene Salamander	Sensitive	May occur in suitable habitats	"No impact"; proposed activities avoid potentially suitable habitats.

Species	Status	Occurrence	Comments
Fisher	Sensitive	May occur in suitable habitats	Approx. 12% of the analysis area is considered suitable habitat.
Flammulated Owl	Sensitive	May occur in suitable habitats	Less than 2% of the analysis area is considered potential habitat.
Fringed Myotis Bat	Sensitive	May occur in suitable habitats	“No impact”; proposed activities are not planned within suitable habitats.
Harlequin Duck	Sensitive	May occur in suitable habitats	“No impact”; proposed activities avoid potentially suitable habitats. Human disturbance patterns would be unchanged by the planned actions.
Pine Marten	MIS	Presence is likely	Suitable habitat exists outside of the old growth habitat used by this species.
Pygmy Nuthatch	Sensitive	There are no records of pygmy nuthatch in the analysis area or on the North Fork Ranger District.	“No impact”; none of the proposed treatment areas overlap with modeled habitat for this species.”
Ringneck Snake	Sensitive	Unlikely	“No impact”; proposed activities are not planned within suitable habitats.
Townsend’s Big Eared Bat	Sensitive	Neither known or suspected to occur	“No impact”; suitable habitat or documented sightings absent.
Western (Boreal) Toad	Sensitive	May occur in suitable habitats	Approx. 33% of the analysis area is considered suitable habitat.
Wolverine	Sensitive	May occur in suitable habitats	Approx. 2% of the analysis area is considered suitable habitat.

The wildlife species shaded in Table 3.3 will not be discussed further in this document, since they either: (1) are neither known or suspected to occur in the analysis area; (2) lack suitable habitat; and/or (3) would not be affected by the proposed activities. Those species that do occur within the analysis area and would be affected by proposed activities are briefly discussed below.

A. Threatened Species

Canada Lynx

The U.S. Fish and Wildlife Service (FWS) listed Canada lynx as a threatened species under the Endangered Species Act (ESA) in March 2000. Following the listing, the Forest Service (FS) signed a Lynx Conservation Agreement with the FWS in 2001 to consider the Lynx Conservation Assessment and Strategy (LCAS) during project analysis, and the FS agreed to not proceed with projects that would be “likely to adversely affect” lynx until the plans were amended.

The population distribution, life history, habitat status and recovery objectives for Canada lynx in Region 1 are detailed in Ruggiero et al. (2000), Ruediger et al. (2000), and USDA-FS (2007). The Clearwater is recognized as secondary, occupied by the FWS and the Northern Rockies Lynx Management Direction (NRLMD). In the 2005 Lynx Recovery Outline FWS categorized lynx habitat as 1) core areas; 2) secondary areas; and 3) peripheral areas. Core areas have both persistent verified records of lynx occurrence over time and recent evidence of reproduction. Secondary areas have historical records of lynx presence with no record of reproduction; or areas with historical records and no recent surveys that document the presence of lynx and/or reproduction. Both the Nez Perce and Clearwater Forests are classified as secondary Canada lynx areas (USDI Fish and Wildlife Service 2006).

Lynx are associated with relatively high-elevation moist conifer forest. Lynx habitat includes mesic coniferous forests that experience cold, snowy winters and provide a prey base of snowshoe hare. It primarily consists of lodgepole pine, subalpine fir, and Engelmann spruce forests, but may also consist of cedar hemlock forests in northern Idaho (USDA FS 2007 NRLMD ROD p. 12). Lynx typically occur above 4,000 feet elevation in Idaho. Lynx utilize Engelmann spruce and subalpine fir habitat types, which may include a component of lodgepole pine, that provide a mosaic of forest age classes for lynx denning and foraging.

A lynx analysis unit (LAU) is delineated to represent a home range of a lynx. Habitat mapping criteria are developed to represent important life history characteristics: foraging and denning. LAU delineations and habitat mapping actions directed by the LCAS (Ruediger et al. 2000) have been completed for the Clearwater National Forest. This mapping was completed in coordination with the FWS. The Lower Orogrande project is not in a LAU; therefore there is no requirement to evaluate this project for consistency with the NRLMD Standards for Vegetation Management activities and practices from the ROD (USDA FS 2007).

B. Management Indicator Species

1. Elk

Summer Range: In north central Idaho, quality elk summer habitat typically occurs in rolling, forested terrain. Areas of preferred use are typically associated with benches or small flats in proximity to water, forage and cover. On gentle slopes, where moist, deep soil predominate, summer forage is available (though to varying degrees of availability and quality) throughout all forest succession stages (Servheen, et. al., 1997). Forage is provided from certain forbs, grasses, sedges and, to a lesser degree, shrubs. The highest levels of elk summer habitat use occur when areas are relatively secluded from human disturbance.

Though occurring in the area, current elk use is low to negligible and relatively localized. Elk populations on National Forest managed lands in the Dworshak Zone (which includes the project area) are lower than desired by the Idaho Department of Fish and Game, but only in comparison with the historically high level achieved in the late 20th Century (IDFG 2011). Both forage availability and quality are declining due to advancing forest succession (trees) outcompeting palatable shrubs, grasses and forbs in past timber harvest units.

Elk summer habitat effectiveness analysis is guided by 1987 CNF Plan standards and interagency guidelines (Servheen et. al., 1997). The Lower Orogrande analysis area includes all or portions of five Elk (summer) Habitat Analysis Units (EAAs), totaling approximately 21,500 acres. Across all EAAs, elk habitat effectiveness averages 48% across and hiding cover averages 93%. Security area occurs on approximately 5% of this landscape. Standard open-road densities (based on standard of road and motorized access) average approximately 1.7 mi/mi^2.

Winter Range: Winter forage is typically provided by certain seral shrubs species (redstem ceanothus, scouler willow, mountain maple and service berry) that are adapted to re-establishment following fire (Leege 1969). Winter forage can also be supplemented with lichens growing in relatively dense stands (thermal cover[1]) of conifers. Douglas fir, western red cedar and ponderosa pine needles also are used for browse forage, particularly in times of extreme cold or wet winter weather. Windthrow and ice breakage are important processes for providing animals access to forage during winter extremes.

Approximately 3,000 acres of elk winter range occur in the lower elevations of the analysis area. Browse forage less than 25 years old comprise approximately 4% (120 ac) of the winter range. Current elk winter habitat use is low to negligible and relatively localized. Both forage availability and quality are declining due to advancing forest succession (trees) crowding out palatable shrubs, grasses and forbs in past timber harvest units.

2. Northern Goshawk

Goshawks use a variety of forest types, structures, and successional stages, and have been primarily associated with late-successional habitat. For nesting, goshawks utilize mature to old growth stands on gentle to moderately steep slopes (Kennedy 2003). Forest habitat that provides prey species (typically, squirrels, rabbits, hares, and smaller birds,) and which is open enough to allow unimpeded flight through the understory (as well as in clearings and along forest edges) is considered suitable for foraging (Brewer et al. 2009). Post-fledging area (PFA) habitat is the area surrounding the nest area which supports concentrated use from the time young leave the nest until they are no longer dependent upon food from adults; PFA is essentially identical in vegetative structure to foraging habitat (Reynolds et al. 1992). Within the analysis area, suitable timber stands including mature and old-growth forest habitats are plentiful and provide 5,745 acres of nesting habitat and 8,752 acres of foraging habitat for goshawks. The presence or absence of goshawks in the analysis area is not known. Relatively recent (2000-2005) goshawk nesting surveys have been conducted in Forest Service Region 1, with the closest sites being about 30 miles east and northeast in the Lochsa and Upper North Fork Clearwater River drainages, respectively. However, no goshawks were observed (Kowalski 2006). Active nests were present on the Idaho Panhandle N.F. about 10 miles north and 20 miles northwest of the analysis area during at least one year during the 2000-2005 period (Kowalski 2006). Moser and Garton (2009) conducted research on 21 active goshawk nests in the Clearwater Mountains of Idaho (but west of the North Fork District) between 2001 and 2005).

Although the presence or absence of goshawks in a given area can be difficult to determine even with a survey (IPNF 2012), Kowalski (2006) estimated that there were several thousand locations in the Region with goshawk present, and that the CNF (as well as all other Forests in the Region) supported goshawks. Based on literature descriptions (USDA 1990; Reynolds et al. 1992, Kennedy 2003, Samson 2006a, and Brewer et al. 2009), there is suitable habitat available within the Lower Orogrande project area, and the Moser and Garton (2009) data suggest that goshawk nests exist at least some years within proximity of the project area.

No specific population data are available for the northern goshawk on the Forest or in the Region. Goshawks are rated secure across its range (global rank G5) and are apparently secure (state rank S4) in the state of Idaho (Digital Atlas of Idaho 2010). Current Breeding Bird Survey (BBS) data are insufficient to allow statistical analysis of population trends for the goshawk, either nationally or for the state of Idaho (Sauer et al. 2008); however, based on habitat requirements and trends (Samson 2006a), local populations (estimated at 100-1,000 individuals on the Clearwater N.F., CNF 2009) are

[1] "For elk a stand of coniferous trees 40 feet tall or taller with an average crown closure of 70 percent or more…."{Lyon and Christensen (1992) as cited in Servheen, 1997, A Partial Glossary of Elk Management Terms}.

likely stable and may be increasing. Habitats on the Clearwater National Forest contribute to a viable population of goshawks at a regional scale (Samson 2006b). IDFG's ADC (2011) does not list any occurrence records within the Orogrande Creek watershed, but does list 7 sightings within a 25 mile radius of the project area. Further, ebird.org records two recent observations within 25 miles of the project area in the North Fork Clearwater drainage, and an older sighting (1976) less than 15 miles to the southwest of the project; individuals of the species nest in or near the cumulative effects area.

Based on the best available science as summarized by IPNF (2010), the goshawk population trend is stable and its habitat appears to be abundant and well-distributed across that Forest and Region (Kowalski 2006, Samson 2006b). Additionally, the Clearwater N.F. contains substantially more than enough habitat distributed throughout the Forest to support a minimum viable population of northern goshawk (Samson 2006b, Table 11). Northern goshawks and active nest sites have been documented widely across the Forest, including territories that have had multiple years of documented occupancy and reproductive success, and surveys periodically locate new territories and nest sites (Kowalski 2006).

3. Pileated Woodpecker

Pileated woodpeckers are often associated with late successional forests, but they also use young and fragmented forests with abundant remnant old structure (Bull and Jackson 1995). Pileated woodpeckers require tall, large-diameter dead or living defective trees within forested stands for nesting (USDA 1990). Nest tree size has been identified as a minimum diameter of 15" to 20" with no upper limit (Samson 2006a and USDA 1990). Carpenter ants make up the bulk of their diet. Feeding habitat includes large snags with advanced decay, the moist decaying butts of live trees, logs greater than 10 inches diameter, and natural or cut stumps. Large trees, canopy cover, and the number and size of feeding sites (e.g. dead trees greater than 10 inches diameter) are all important features of quality pileated habitat (USDA 1990). Activities that reduce these habitat features may affect pileated habitat suitability.

There is a recent record of a pileated woodpecker observed in the project area along Orogrande Creek, just downstream from the Pine Creek confluence (ebird.org 2012) and pileated foraging sign has also been observed in the project area (Talbert 2012, personal communication). In a report outlining pileated woodpecker surveys conducted by the Coeur d'Alene Audubon Society on the Idaho Panhandle National Forest in 2003, it was noted that pileated woodpecker responses correlated very tightly with observations of pileated foraging sign (IPNF 2011), so it is reasonable to conclude that pileated woodpeckers are present in the project area.

The pileated woodpecker is rated secure across its range (global rank G5) and apparently secure (state rank S4) in Idaho (Digital Atlas of Idaho 2010). Current BBS data show that populations of the pileated woodpecker are increasing nationally (Sauer et al. 2008). Idaho state data for this species are insufficient to allow statistical analysis of population trends (Sauer et al. 2008); however, based on habitat requirements and trends (Samson 2006a), local populations (estimated at 1,000-10,000 individuals on the Clearwater N.F., CNF 2009) are likely stable or increasing. Habitats on the Clearwater National Forest contribute to a viable population at a regional scale (Samson 2006b). The IDFG ACD does not list any occurrence records within the Orogrande Creek watershed, or within a 25 mile radius of the project area. However, ebird.org records a recent observation within the project area, and pileated woodpecker sign was present in the project area. Thus, individuals of the species undoubtedly inhabit the Lower Orogrande area.

Based on the best available science, the pileated woodpecker population trend is increasing (Sauer et al. 2008), and its habitat appears to be abundant and well-distributed across the Forest and Region (Samson 2006a). Pileated woodpeckers and their foraging sign are commonly seen and documented across the Forest (D. Kenney, personal observation).

4. Pine Marten

Pine martens are members of the weasel family and closely related to fishers. They are widely distributed in northern North America in general and in moderate to high elevation forests in Idaho in particular, where they are abundant enough to be legally (and apparently sustainably) trapped for the fur trade (nearly 1,000 statewide in the 2009-2010 season, IDFG (2010)). In a literature review, Buskirk and McDonald (1989) cited studies where marten average home ranges varied widely from a 146 to almost 7,000 acres per animal. In northeast Oregon, Bull and Heater (2001) determined that mean male marten home range was a little over 6,700 acres (with a minimum of about 3,000 acres) while mean female home range was about 3,500 acres (with a minimum of about 1,000 acres); these authors recommended ~6,700 acres per marten pair as a management goal for maintaining marten viability.

Stone (2010) notes that male martens do not overlap home ranges but may allow use by females and juveniles; females may also have home range overlap. So, based on the Bull and Heater (2001) home range data and without factoring in habitat suitability, the Lower Orogrande project area has the potential to fully support on the order of 2-4 male martens and up to 10 females or juveniles. Buskirk and McDonald (1989) suggested that marten home range size tends to be smaller in high quality habitat, but Bull and Heater (2001) found that selection of habitat within the home range is likely more important than the proportion of unharvested forest.

Pine marten are relatively abundant on the North Fork Ranger District and on the Idaho Panhandle National Forest to the north, where substantial efforts have been made to detect the species (IPNF 2011). The IDFG's ADC shows about 2 dozen sightings within a 25 mile radius of the project area while, the Coeur d'Alene Tribe's marten and fisher database (Albrecht (2012), personal communication) lists records of marten occurrence as close as one mile from the project area, with more than five dozen records within a 25 mile radius. No marten or marten sign were observed in the project area during preparation for the proposed project (which is to be expected, given the animal's secretive nature), and the Forest does not have a record of any martens captured or seen in the Lower Orogrande area. Based on proximity and apparently suitable habitat, however, it seems very likely that pine marten inhabit the Lower Orogrande area, at least as transients.

No specific population data are available for the marten, though it is apparently secure (state rank S4) in Idaho (Digital Atlas of Idaho 2010). The marten population is estimated at 1,000-10,000 individuals on the Clearwater N.F. (CNF 2009), and the IDFG allows trapping of the species, with 9 animals reported taken in Clearwater County during the 2009-2010 season (IDFG 2010). Samson (2006b) showed that habitat on the Clearwater N.F. is more than sufficient to contribute to a viable population of the marten at a regional scale.

C. Sensitive Species

1. Fisher

Fishers are associated with diverse coniferous habitat types and successional stages. Fishers often select moist habitats, characterized by dense canopy cover, in mature or late mature stands of lodgepole pine, spruce, subalpine fir, grand fir or cedar. Fisher habitat use is frequently associated with forested riparian areas (Jones 1991, USDA Forest Service, 1998, #411), often in proximity to alder glades and small meadows. They appear to prefer low gradient, north facing riparian habitats (typically less than 400 m from perennial streams). On the other hand, the U.S. Fish and Wildlife Service (76 FR 38504) notes that fishers in north central Idaho expanded their use of young forests in the winter, and that the composition of most fisher home ranges is a mosaic of different forest environments and successional stages. The USFWS also referenced a study in north central Idaho which measured male fisher home ranges as being 7,400 to 30,000 acres, and female home ranges as 1,500 to 18,500 acres.

An estimated 2,550 acres (12% of the analysis area) are currently considered suitable fisher winter habitat. Approximately 130 acres are considered summer habitat. Past timber harvest in the project analysis area concentrated on mature forest stands that would have qualified as fisher winter habitat. Fisher habitat remains “connected” via reforested, mid-seral forest stands and mature-forest RHCAs. Large, down wood in mature forest habitats provide fisher with both hunting and denning opportunities. Hunting and denning opportunities in dense, young forest stands (such as those being considered for pre-commercial thinning and slashing/burning) offer only limited prey densities/variety and lack large, down wood for denning. These stands should be considered marginal fisher habitat with only incidental habitation/use expected.

Fisher appears to be relatively abundant on the North Fork Ranger District. The Idaho Department of Fish and Game (IDFG) Animal Conservation Database (ACD) (2011) shows six documented sightings within the project area as well as several dozen additional sightings within a 25 mile radius of the project area. The Coeur d’Alene Tribe’s marten and fisher database (Albrecht (2012), personal communication) lists records of fisher occurrence as close as one mile from the project area, with more than five dozen records within a 25 mile radius. In addition, the IDFG (2010) reports 18 fisher accidentally trapped in the Clearwater Region and turned in for the reward between 1991 and 2010. Samson (2006b) estimated a minimum of 100,100 acres of suitable habitat within a given Northern Region National Forest is needed to maintain a minimum viable population of fisher. This analysis further concluded there are approximately 365,700 acres of currently suitable fisher summer habitat, and 686,900 acres of currently suitable fisher winter habitat available on the Clearwater National Forest.

2. Flammulated Owl

Flammulated owls are typically found in mature ponderosa pine/Douglas-fir forest with shrub understories for nesting, which is not common in the project area. Individuals of the species prefer abundant forest edges or ecotones with adjacent grass/forb communities for foraging. Flammulated owls nest in relatively large trees in open areas, favoring larger diameter tree habitats with abundant woodpecker cavities. Opening the forest understory, while retaining larger ponderosa pine, Douglas fir and western larch, improves flammulated owl habitat.

About 350 acres (less than 2% of the analysis area) are currently considered potential flammulated owl habitat, based on the CNF GIS habitat model. Preferred habitat for each of these species is predominately more xeric than what the model depicts (J. Bonn, personal communication 2011). In addition, high stem (tree) density and increasing height growth of Douglas fir and shade tolerant grand fir in the understory of untreated stands “congests” the understory of otherwise potentially suitable flammulated owl habitat.

There are no records of flammulated owls in the Lower Orogrande analysis area, or on the North Fork Ranger District (IDFG ADC 2011, ebird.org 2012). Recent flammulated owl survey transects on the North Fork District (including within and near the project area) did not detect the species (Cilimburg

2006), but flammulated owls been observed at relatively low-elevation sites in north central Idaho (including at one site on the CNF, about 30 miles southeast of the project area (Cilimburg 2006)), typically within ponderosa pine stands. Samson (2006b) estimated a minimum of 4,700 acres of suitable habitat within the Northern Region is needed to maintain a minimum viable population of flammulated owls. This analysis further concluded there are approximately 15,900 acres of currently suitable flammulated owl habitat available on the Clearwater National Forest.

3. Western (Boreal) Toad

Western toads use moist areas such as streams, ponds and lakes, and riparian areas for breeding, foraging and overwintering habitat. They prefer shallow areas with mud bottoms and high temperature areas, often in sites with vegetation present for breeding. A wide variety of upland habitats are used during non-breeding times. Riparian areas serve as migratory or dispersal corridors. Important upland habitat structure needed includes down woody debris, where individuals can access moist microhabitats during the hot daytime summer hours to avoid desiccation.

No specific population data are available for western toads, but it is apparently secure (G4/S4) across its range and in the state of Idaho (Digital Atlas of Idaho 2012), although declines in abundance have been reported throughout the species' range (Keinath and McGee 2005). There have been no recorded sightings for this species within the analysis area, but the IDFG ADC (2011) records 7 sightings within a 25-mile radius of the project area, including at a site near the mouth of Weitas Creek, about 3 miles away. There have been no targeted surveys for western toads in the project area, but there is no reason to suspect that the species is absent. Using the CNF GIS model for this species yields approximately 7,000 acres (33% of the analysis area) that may be suitable or potential habitat for western toads. The model, because it includes all areas within 300 feet of any perennial water body, overstates the abundance of toad core breeding habitat, but may understate the abundance of suitable foraging habitat.

Past activities may have contributed to current habitat conditions. Specifically, timber harvest and especially road construction have contributed to degradation and loss of both riparian and upland western toad habitats. At the same time, road construction created small habitat patches in roadside ditches and other areas of ponded water. More recently, the use of PACFISH/INFISH buffers has minimized the effects of new activities on toads and their habitats. The effects of these activities on toads and their habitats have not been quantified.

4. Wolverine

Wolverines typically inhabit large areas. Within the western U.S., wolverines occur principally in remote, high-elevation mountain basins and cirques, particularly during the breeding season (Rowland et al. 2003). Ruggiero (1994a) reported average home ranges for adult wolverine range from less than 40 square miles to over 350 square miles. Habitat types used by wolverines include scattered mature timber of sub-alpine fir, lodgepole pine, western larch, Douglas fir and mixed conifers, near rockslides, avalanche areas, cliffs, swamps and meadows.

Wolverines are habitat generalists and typically inhabit remote mountainous areas where human disturbance is unlikely. They typically winter at approximately 4500 feet elevation and summer at elevations exceeding 6000 feet and are omnivorous and opportunistic scavengers, taking advantage of food sources that are easily obtained; ungulate carrion is considered an important food source.

In Idaho, wolverines inhabit montane, mature forests associated with subalpine rock/scree habitats in areas of low human occurrence (Copeland and Hudak 1995) and the subalpine rock/scree habitats are used for foraging and for natal denning; none of the subalpine habitat denning habitat occurs in the analysis area. The IDFG ADC (2011) records one sighting of wolverine within the Lower Orogrande analysis area, and another 18 within a 25 mile radius of the project area. The best wolverine habitats on the CNF are typically associated with conifer stands over 75 years old and NE-SW aspects above elevations of 4500 feet, but the GIS foraging habitat includes all areas above that elevation. The model considers 600 acres (2% of the analysis area) as suitable wolverine habitat.

V. Vegetation (Ref: Lower Orogrande Vegetation Report)

Vegetation concerns for the Lower Orogrande project area include forest cover types, insects and disease, distribution of forest successional stages, landscape pattern, climate change, and sensitive plant species.

A. Forest Cover Types

The forest cover types in the project area are dominated by grand fir (*Abies grandis*), western redcedar (*Thuja plicata*), and Douglas-fir (*Pseudotsuga menziesii*), and their percentages within the project area are displayed in the following table:

Table 3.4 - Current Forest Cover Types

Cover type	Historic Distribution[2]	Current Distribution
Spruce/fir	2%	58%
Western redcedar	-	23%
Larch/Douglas-fir	22%	14%
Western white pine	34%	2%
Lodgepole pine	9%	1%
Ponderosa pine	21%	1%
Other	-	1%

The data in Table 3.4 shows that the forest was once dominated by early seral species and has now become dominated by mid-seral and climax species. Historically, western white pine (*Pinus monticola*) was the most important forest cover type in North Idaho, occupying the region's cooler moister sites in elevations between 2,000 feet and 5,500 feet. (Haig, 1932). Because of the shade intolerance of western white pine, successful fire suppression efforts of the 1900s discouraged the continued reproduction of white pine, as did the introduction of white pine blister rust. Due to the lack of stand replacing disturbances and lack of naturally occurring blister rust resistant seed sources on the landscape, western white pine is being supplanted by more shade tolerant, more disease susceptible species, including grand fir and Douglas-fir (Fins, et al 2001). Site specific observations in the project

[2] Current distribution data taken from Clearwater National Forest GIS data; historic taken from Losensky 1994.

area verify the observations made by Fins et al. In the stands proposed for vegetation management, the most abundant species are shade tolerant species, rather than early seral species such as western white pine or western larch (*Larix occidentalis*).

Past harvest activities within the Lower Orogrande project area have also set the stage for forest cover types to depart from historical species distributions. Previous regeneration harvest within the project area has helped determine which tree species currently dominate the sites. In previously regenerated units, natural regeneration was heavily relied upon to restock the sites. In many cases, this virtually guaranteed that the units would be restocked with shade tolerant species such as grand fir and Douglas-fir for various reasons. In these past regeneration units, grand fir and Douglas-fir probably regenerated the site due to a shortage of western white pine seed and insufficient distribution of western larch to provide seed source. In cases where past harvest simply salvaged white pine that had been killed by blister rust, the harvest would not have created sufficient openings for early seral species, such as white pine and western larch, to regenerate successfully.

B. Insects and Disease

Perhaps the most significant disease impact within the project area is caused by white pine blister rust. The current stocking levels of white pine across the landscape in this project area are significantly lower than historic levels due to several factors including white pine blister rust. The precise extent of the disease is not known, but due to evidence of salvage logging in many units across the project area, it can be inferred that white pine blister rust has shaped the landscape significantly. The extent to which other diseases or insect attacks affected the current populations of white pine is unknown. White pine blister rust continues to affect the project area and is infecting western white pine trees that are not resistant. White pine blister rust has significantly decreased the amount of white pine present in the project area, which in turn has allowed the forest to continue along the successional pathway and become dominated by the more disease prone and less insect resistant Douglas-fir and grand fir.

Current insect activity noted in these species within the project area includes Douglas-fir beetle (*Dendroctonus pseudotsugae*), western hemlock looper (*Lambdina fiscellaria lugubrosa*), and fir engraver beetle (*Scolytus ventralis*). Other insects were not observed specifically, but it can be assumed that other forest insects indigenous to the Inland Northwest occur at endemic levels within the area.

Root disease is a common problem in the area due to the dominance of Douglas-fir and grand fir, which are both highly susceptible to root disease. *Armillaria ostoyae* was identified within the project area and *Fomes annosus* and *Phellinus sulphurascens* are suspected. Root disease is quite prevalent and can cause mortality as well as increase susceptibility of trees to bark beetle- caused mortality. Indian Paint (Echinodontium tinctorium), a heart rot pathogen, was also observed in the grand fir.

Larch needle blight (*Hypodermella laricis*), larch needle cast (*Meria laricis*) and small amounts of dwarf mistletoe (*Arceuthobium laricis*) were observed in the western larch. Larch needle blight and larch needle cast generally do not cause significant impacts to larch trees in a forested setting. Dwarf mistletoe can cause reduced growth and eventual mortality if infection is severe. (Hoffman 2008)

C. Successional Stages

Successional stages were analyzed for the Big Game Habitat Restoration on a Watershed Scale (BHROWS) Assessment, which assessed conditions on the North Fork of the Clearwater Sub-basin. This analysis showed that early successional stages (under 40 years of age) covered about 14% of the sub-basin, compared with historical conditions (reference year 1900) of 35-45% of in early successional stages (USDA Forest Service 1999). This shows that in order to trend toward historical distribution of successional stages, an additional 20-30% of the analysis area needs to be returned to the early successional stage. The BHROWS assessment also showed that the late successional stands historically covered 35-45% of the sub-basin and they now only cover 25-30% of the area.

D. Landscape Pattern

Turner et al. (2001) assert that "the size, shape, and spatial relationships of patches on the landscape influence the structure and function of ecosystems." Attempting to emulate historic disturbance patterns is "likely to minimize adverse impacts on complex ecological processes that knit together the forest landscape" (North and Keeton, 2008). Because this project analyzes an entire watershed, the appropriate ecological unit with which to assess disturbance patterns for this project area is the landtype association (Cleland et al., 1997).

There are four different Landtype Association (LTA) groups that represent the majority of the land in this project area. These LTAs, in order of prevalence include colluvial midslopes, non-umbric low relief rolling hills, high energy deep soil breaklands, and low energy breaklands (Clearwater National Forest GIS data). The following statements characterize each LTA within the Lower Orogrande analysis area:

<u>Colluvial Midslopes:</u>

- Lethal fire occurring every 76- 150+ years was the primary fire regime.
- Resulting patches had a variable mosaic pattern 200+ acres in size.
- Regeneration harvest that occurred the early 2000s created a landscape pattern that has patches smaller than what would have been historically created by fire.

<u>Non-Umbric Low Relief Rolling Hills:</u>

- Lethal fire occurring every 150-300 years was the primary fire regime.
- Resulting patch sizes ranged from ¼ acre to patches exceeding 1,000 acres.
- This LTA has fewer large patches than historic patterns, since timber harvest in the 1960s created one large, fairly contiguous patch.
- It is likely that this LTA has more small patches than historic patterns, due to the high incidence of root disease and the diffuse pattern with which it occurs across this landscape.
- Within this LTA there is a lack of tree species diversity and successional stage diversity, which increases the risk of catastrophic biotic or abiotic damage to the forest.

<u>High Energy Deep Soil Breaklands:</u>

- Mixed fire severity with lethal and non-lethal fires occurring every 50-100 years was the primary fire regime.
- Resulting patches were less than 200 acres in size, with a patchy mosaic pattern.
- This LTA is probably similar to historic patterns, though additional patches smaller than 200 acres may be needed to decrease patch size of some patches larger than 200 acres.

Low Energy Breaklands:

- Lethal fire occurring every 76- 150+ years was the primary fire regime.
- Resulting patches were uniform and 200-500 acres in size.
- The pattern in this LTA is not consistent with the historic disturbance pattern, because several patches smaller than 200 acres occur within this LTA.

E. Climate Change

The second strategic goal of the U.S. Department of Agriculture's Strategic Plan for FY 2010-2015 is to "Ensure our national forests and private working lands are conserved, restored, and made more resilient to climate change, while enhancing our water resources" (U.S. Department of Agriculture 2010). The Strategic Plan emphasizes restoring declining ecosystems and increasing resilience on federal lands.

Resilience is one of the keys to responding to climate change (Forest Service Strategic Framework for Responding to Climate Change). Resilience is defined as "the capacity of a (plant) community or ecosystem to maintain or regain normal function and development following disturbance" (Helms 1998). The existing condition of the vegetation in relation to a changing climate, then should be gauged in terms of the resilience of the vegetation. Resistance, "the ease or difficulty of changing the [ecological] system", is one of the attributes of resilience (Walker et al 2004). Holling (2001) asserts that resistance can be increased by increasing diversity. Resistance is considered low in the analysis area relative to historical conditions because of low amounts of successional stage diversity as well as underrepresentation of species.

The effect the analysis area is having on climate change is impossible to calculate. If sequestration of CO_2 is used to calculate the forest's effect on climate change, stands within the analysis area do not meet the mitigation guidelines set forth in the Forest Service Strategic Framework for Responding to Climate Change. The mitigation guidelines of this strategy suggest that "not taking action to improve ecological health will likely result in substantially lower carbon stocks and substantially increased carbon emissions in the future as the result of severe wildfire, and losses from insects, and disease" (USDA Forest Service 2008). Given this guideline for mitigation of climate change, the project area is currently not meeting mitigation standards for climate change. Site specific visits to the analysis area revealed stands that are prone to insects and disease due to high stocking levels and low vigor. Site specific visits also revealed stands that are primarily comprised of species that are more prone to insect and disease attacks (such as grand fir and Douglas-fir) than species that historically dominated the sites (such as western white pine and western larch).

F. Sensitive Plant Species (Ref: Lower Orogrande Rare Plant Report)

The Orogrande Creek watershed is botanically important as part of the overall North Fork Clearwater basin, which is noted for coastal disjunct vegetation and a wide assemblage of rare plant species. Overall the project area is dominated by moist, mixed conifer forests with potential vegetation being mostly of various western red cedar habitats. The upper elevations grade into the Grand Fir Mosaic forest communities, which are mesic, highly productive mixed conifer forests characterized by open alder glades. The riparian area of Orogrande Creek and its larger tributaries forms diverse complex of shrub swamps with some grass and sedge dominated communities. All of these habitats potentially support rare or unusual plant species and associations.

Potentially suitable habitat occurs for at least 14 sensitive plant species (shown in Table 3.6), though there is only one documented occurrence. Given the extensive area of suitable habitat for some species of concern, it is anticipated that undocumented populations occur. Some plant communities in the watershed have been altered through time, by timber harvest, fire exclusion and several other factors that have contributed to the present condition. These past management activities have had variable effects on rare plant species and their habitats, ranging from enhancement to reduction.

The only known occurrence of a sensitive plant species in the project area is a single deerfern plant from the Pine Creek drainage, which is located away from any proposed activities. Habitat for at least thirteen other sensitive plant species occurs in the project area. Most are components of the Clearwater refugia, a zone of coastal disjunct plant assemblage. Table 3.5 summarizes species occurrence and potential habitat in the Lower Orogrande project area:

Table 3.5 - Potential Sensitive Plants within the Project Area

Common and Latin Name	Presence	Habitat/Community Type	Potential Habitat (acres)
Deerfern *Blechnum spicant*	Known	Mid-elevations of shaded, mature cedar and western hemlock, often riparian.	16,844
Lance-leaf moonwort *Botrychium lanceolatum* var. *lanceolatum*	Potential	Shaded moist sites under various conifers; dry to moist meadows.	356
Linear-leaf moonworts *Botrychium lineare*	Potential	Shaded moist sites under various conifers; dry to moist meadows.	356
Mingan moonwort *Botrychium minganense*	Potential	Shaded moist sites under various conifers, usually western red cedar; also meadows.	356
Mountain moonwort *Botrychium montanum*	Potential	Shaded moist sites under various conifers, usually western red cedar.	356
Northern moonwort *Botrychium pinnatum*	Potential	Shaded moist sites under various conifers; dry to moist meadows.	356
Least moonwort *Botrychium simplex*	Potential	Forest openings, dry to moist meadows.	356
Green bug-on-a-stick *Buxbaumia viridis*	Potential	Moist grand fir or cedar forests on large decayed logs and ash soils.	20,535
Constance's bittercress *Cardamine constancei*	Potential	Breaklands and stream terraces, in maritime environments of low-elevation river canyons; coastal disjunct communities.	270
Clustered lady's-slipper *Cypripedium fasciculatum*	Potential	Partial shade of warm and moist cedar, grand fir or Douglas fir.	10,508
Light moss *Hookeria lucens*	Potential	Wet sites in humid coniferous forest, occasionally submerged and generally close to water courses.	3,392
Naked rhizomnium *Rhizomnium nudum*	Potential	Moist substrates at low to moderate elevation in cool to warm mesic forests. Often riparian.	19,670
Evergreen Kittentail *Synthyris platycarpa*	Potential	Cool, moist mixed forest of the grand fir mosaic.	2,153
Short style toefieldia *Triantha occidentalis ssp. brevistyla*	Potential	Wet meadows, streambanks, and peatlands.	1,446

VI. Transportation and Access Management (Ref: Transportation Report)

The Lower Orogrande project area is located on the western boundary of the North Fork Ranger District. Idaho Department of Lands (IDL) and Potlatch Corporation (Potlatch) make up portions of the western boundary of the project area; the southern and eastern boundaries of the project area consist almost exclusively of National Forest System (NFS) lands.

The closest community to the Lower Orogrande project area is Pierce, ID, famously known as a major producer of gold in the mid-19th Century. Major access to the project area is from the west via National Forest System (NFS) Road 250 (approximately two miles south of Pierce, ID) as well as NFS Road 669, which travels through multiple land ownerships (Forest Service, Potlatch, IDL) and is primarily accessed from the vicinity of Pierce, ID.

Currently, transportation use throughout the project area is moderate. While there are few developed recreation facilities in the project area, there are trails nearby, including the Clarke Mountain trail system, open to motorized and non-motorized users. In addition, visitors use the existing transportation system to engage in a variety of additional pursuits including hiking, dispersed camping, berry picking, driving for pleasure, hunting and firewood gathering.

The current road system throughout the project area consists of approximately 224 miles of National Forest System Roads, or 6.1 miles of road per square mile.

VII. American Indian Relations

Treaty Rights and Traditional Use: The Lower Orogrande analysis area lies within the 1855 treaty rights boundary and "northern homeland" of the Nez Perce Tribe.

Overview of Cultural and Historical Values: The entire Lower Orogrande area is important to the Nez Perce Tribe as an area rich in tribal tradition for gathering, hunting, fishing, camping, and religious activity. The area is important to the Nez Perce people who value access to their traditional land use areas.

Laws, Regulations, and Designations: Historical, cultural, and traditional properties in the Lower Orogrande watershed are regulated by a number of federal laws and regulations, including the National Historic Preservation Act, 36 CFR 800 – Protection of Historical and Cultural Properties, the American Indian Religious Freedom Act, the Archaeological Resource Protection Act, and the Native American Graves Protection and Repatriation Act.

Forest Plan: Forest Plan direction is to protect Indian tribal rights as retained in treaties and other agreements, and to protect religious ceremonial sites and hunting and fishing rights. Other agency plans direct the Forest Service to work closely with area Indian tribes to achieve mutual goals and objectives, and to insure that trust responsibilities of Indian treaties are honored.

VIII. Economics (Ref: Lower Orogrande Economics Report)

Clearwater County has approximately 9,000 people living within its boundaries. Most of the population (approximately 94%) is Caucasian, and the median income is $39,800 (http://quickfacts.census.gov/qfd/states/16/16035.html). Latah and Nez Perce counties are within the commuting area of the planning area. The area has a long history of logging as this area was previously managed by Weyerhaeuser (later Potlatch Forest Industries). There was a major logging railroad system (with numerous side tracks) that went from Elk River through Potlatch and onward to points in the state of Washington.

The Interior Columbia River Basin Ecosystem Management Project released a report that examines the economic and social conditions of 543 communities in the Upper Columbia River Basin (USDA Forest Service, 1998). The analysis looked at geographic isolation, community specialization in different industries, and association with Forest Service and Bureau of Land Management administered lands.

The study concluded that isolated towns such as Elk River, Orofino, Bovil, Pierce and Weippe are different from non-isolated towns. This is due to a higher percent of the population being more specialized in agriculture, wood products, mining, or the Federal Government (i.e. a high percent of Forest Service or Bureau of Land Management lands lie within a 20-mile radius). Pierce is the community closest to the Lower Orogrande project and is considered an isolated timber dependent community with employment specialization in agriculture (USDA Forest Service, 1998).

Timber dependent communities have been defined as those in which primary forest products manufacturing facilities provide ten percent or more of the total employment in the community. The scientific assessment for the Columbia River Basin project concluded that 64 isolated communities in the Columbia River basin are timber specialized. Elk River, Orofino, Pierce, Weippe, and Lewiston are considered timber specialized communities (USDA Forest Service, 1998).

Timber sales and related activities such as fuel treatment projects may have an effect on local communities, primarily through their potential impact on rural employment. Timber sales and stewardship contracts directly influence the wood products industry, local governments (Secure Rural Schools and Community Self-Determination Act), and recreation (Road and Trail Fund). Many other economic sectors may be indirectly influenced as they engage in business transactions with these directly impacted industries.

CHAPTER 4

ENVIRONMENTAL CONSEQUENCES

This chapter describes the effects of each alternative, based on the issues identified in Chapter 2, and is the scientific and analytic basis for the comparison of the alternatives described in Chapter 2. The resource components are discussed in the same order as in the previous chapter. Each discussion centers on impacts (effects) that are direct, indirect, or cumulative. These can be either beneficial or adverse and are defined as follows:

Direct impacts are caused by the action and occur at the same time and place [40 CFR 1508.8(a)].

Indirect impacts are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable [40 CFR 1508.8(b)].

Cumulative impacts are those that result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions [40 CFR 1508.7]. A cumulative effects analysis was completed for each resource component using the following steps: (1) establish the geographic boundary for the analysis; (2) establish the time frame for the analysis; and (3) identify past, present, and reasonably foreseeable future actions. For most resources, a summary of past actions was used in describing the existing condition in Chapter 3 (refer to Appendix A for a map of past actions). There are no present or ongoing projects within the analysis area, and the only foreseeable future action is the Orogrande OHV Trail project, which was considered where applicable.

I. Soils (Ref: Lower Orogrande Soils Report and Soils Report Supplement)

A very detailed soils analysis is located in the project file. What follows here are the highlights of that analysis in regards to the issues of soil stability, landslide hazard potential, and soil productivity and the effects of the alternatives on each.

A. Analysis Methodology

The soils analysis used GIS-generated queries, maps and reports, aerial photos, and field monitoring and review to analyze the effects of the proposed activities on the soil resource in the Lower Orogrande project area. Forest Service Activities Tracking System (FACTS) queries were used to identify the type and time of past harvest activities. Landtypes mapped and described in the Land System Inventory of the Clearwater National Forest (Wilson et al., 1983) were used in an erosion hazard assessment to evaluate erosional characteristics for the project area and individual treatment units. Proposed treatment units were analyzed for landslide risk based on the five landslide factors of slope angle, geologic parent material, landform, aspect and elevation. Landtype associations (LTAs) were used to describe terrestrial characteristics and disturbance processes for the project area.

A pre-field assessment of soil disturbance and landslide hazards in proposed treatment units was made using a combination of GIS-generated queries, maps and aerial photos, to prioritize field visits and develop a sampling strategy and intensity. Treatment units were stratified by landtype, landslide hazards and previous activities, and selected units within stratification groups were visited and evaluated for disturbance using the USDA Soil Disturbance Monitoring Protocol (SDMP) (Page-Dumrose et al., 2009). This protocol consists of sampling along random azimuths at fixed point-spacing. At least 30 points were sampled in a unit. At each sampling point, soil pits were dug to at least 30 cm and visual measurements were made that documented factors related to soil disturbance including forest floor condition, soil compaction, displacement, rutting, platy structure and burn intensity. Disturbance class and the presence of detrimental soil disturbance (DSD) were determined at each point, and the percent DSD of each treatment unit was calculated. Timber harvest Units 4, 8, 10, 11, 17, 19, 20, 25, 26, 27 and 28 were reviewed using this technique. Results and observations from additional field visits by the soils and other Forest Service specialists were combined with data extracted from aerial photos and GIS databases (i.e. previous harvest activity, road disturbance) to estimate soil disturbance in similar treatments units within sampling stratification groups.

B. Effects Analysis

The spatial scope for direct, indirect, and cumulative effects is the individual treatment units of varying size and temporary roads associated with treatments units. The temporal scope for direct and indirect effects is several decades (30-50 years), pre- and post- activity.

Activities Not Analyzed in Detail: Road improvements and road decommissioning were not analyzed in detail, because they are related to Forest system roads or have no detrimental ground-disturbing activities associated with them. Precommercial thinning was also not analyzed in detail, since this treatment would involve hand operations and no ground-based equipment. Slash disposal, in most cases, would consist of a “lop and scatter” method, which would leave slash within the treated areas and not add to the existing soil disturbance.

Activities Analyzed in Detail: Regeneration and commercial thin harvests and temporary road construction are analyzed in detail since these activities can contribute to detrimental disturbance calculations, cause erosion, increase landslide risks, and can affect soil productivity. Detailed descriptions of differences between alternatives are presented, yet due to the similarities between action Alternatives 2 and 3 in the number of acres treated or types of treatments, the alternatives effects discussion is combined where appropriate.

Openings Greater than 40 acres in Size: Only Unit 2, a proposed opening greater than 40 acres, is included in both action alternatives. Openings greater than 40 acres are not a soil resource issue. Silvicultural, wildlife and economic issues were the dominant determinants of proposed unit boundaries and locations. Soils effects were considered in unit delineation and location primarily through prioritizing the use of existing roads and minimizing new soil disturbance.

1. Direct and Indirect Effects on Soil Stability and Landslide Hazard

Alternative 1 (No Action): This no-action alternative maintains existing soil stability and landslide potential. The current landslide risks would not change due to vegetation treatments, since no treatment activities are proposed. The road decommissioning activities would not occur and the landslide and debris torrent risks associated with roads no longer needed for management would remain across the project area. Without road decommissioning activities benefits to slope stability through road recontouring and culvert removal would not be obtained. Culvert replacements would not occur in this alternative, and the risk of debris torrents from failure of undersized and/or deteriorated culverts would persist.

Alternatives 2 and 3: As reported in the revised DEIS, There was no difference between Alternatives 2 and 3 in the number of units or acreage on areas with high landslide hazards. The landslide hazard analysis for each unit under both alternatives resulted in the same effects on soil stability and landslide hazard potential. Seven units (19, 20, 21, 22, 23, 24, 25), totaling 326 acres, were identified as having overall high landslide hazard ratings. Many areas within these units would require live-canopy retention measures to avoid increasing the landslide risk. The remaining units under each alternative have overall low or moderate landslide hazards.

Following this project's 2013 Record of Decision, implementation of Unit layout activities commenced during the fall season. The implementation of Design Measures #1-3 resulted in reduction in size or elimination of the original seven units. Preliminary unit layout information was reported in the draft ROD (2014), which reduced the gross acreage of affected landslide prone areas down to 292 acres. Since then, final unit layout information has reduced that acreage down to just 16 acres, divided between Units 20 and 21. Of this remaining acreage, none of it contains areas having a high risk of landslides. Thus, the issue of soil stability has been addressed by eliminating all landslide prone areas from proposed treatment.

2. Cumulative Effects on Soil Stability and Landslide Hazard

Geographic Boundary: Within treatment unit boundaries, cumulative effects are assessed within the soil stability and landslide hazard analyses, with effects of proposed activities limited to immediate treatment boundaries.

Time Frame: Mass soil movement (i.e. landslides) due to proposed activities can take several decades to dissipate to the point where recovery of productivity has occurred. Impacts on soil stability from tree harvest and/or prescribed burning are considered to extend at least 20 years after the action. This analysis considers impacts from previous logging and mining and database and aerial photo information from the 1960s to the present.

Past, Present, and Foreseeable Future Actions: All past activities have been assessed as part of the existing condition and there are no present or future foreseeable activities planned in the analysis area that would contribute to cumulative effects.

Alternative 1 (No Action): There are no cumulative effects related to the No Action alternative since cumulative effects can only arise from the incremental impact of an action when added to other past, present, and reasonably foreseeable future actions. There are no actions associated with this alternative. Estimating the likelihood, timing and/or extent of a wildfire event would be difficult at best and is therefore not included in this determination.

Alternatives 2 and 3: Since there are no longer any direct effects on mass erosion or landslide hazard risk, and indirect effects are expected to be minimal due to design features and BMP implementation, there would be no cumulative effects.

3. Direct and Indirect Effects on Soil Productivity

Estimates of increased detrimental soil disturbance (DSD) from proposed activities (ground-based harvest, skyline yarding, burning and temporary road construction) are based on the following assumptions:

- Ground-based harvest equipment are estimated at eight to twelve percent (average 10 percent) of an activity area based on use of designated skid trails (Archer 2008). Disturbance is generally limited to main skid trails and landings. Soil disturbance can be minimized by using existing skid trails and/or by designating the locations of new skid trails (Froehlich and Adams 1984, Froehlich and McNabb 1983).
- Skyline yarding effects are estimated at two percent of an activity area and disturbance is mostly concentrated at landings (Archer 2008).

- When identified as a required design and mitigation measure in specific units, limits on acres of allowable new DSD would be integrated into a logging layout plan to result in post-project percent DSD of less than 15% for any unit.
- Temporary roads (and heavily-used forwarder trails) are considered 100% detrimental disturbance with reduced soil productivity until vegetation, organic matter, and hydrologic function is restored. These dimensions of temporary road are equivalent to 3 acres of disturbed area for each mile of temporary road. Based on these estimates, temporary roads in alternative 2 would affect up to 7% percent of an activity unit.
- Activity generated slash piled along road sides and in landings would be treated using sale of biomass materials, chipping, or burning. Treatment of slash is already incorporated in the estimates discussed above. Pile and burning slash on existing skid trails would overlap detrimental disturbance on already disturbed areas and minimize new soil impacts (Korb 2004).

Alternative 1 (No Action): This alternative maintains the existing condition. Existing detrimental soil disturbance would persist with a slight natural recovery of surface layers of compacted soils.

Alternatives 2 and 3: For each alternative, current detrimental soil disturbance (DSD) from past activities ranges from 0 – 10.3% (see Appendix E, Tables E-1, E-2). All proposed units are currently under the 15% DSD standard and currently comply with the Region 1 Soil Quality Standards. Proposed activities would increase DSD by 0 to 11.0%, depending on the unit and treatment proposed (see Appendix E). In all units, existing skid trails and landings would be used when present to limit the extent of new soil disturbance (see design measure #6, chapter 2). Skid trails and landings used would be decommissioned after use to support recovery of soil function and productivity.

In both alternatives, the decompaction, seeding, and addition of organic matter through proposed road decommissioning would improve soil properties and productivity across the project area. These actions would improve or maintain soil productivity by improving soil porosity, biological activity, and surface and subsurface water flow. Forest monitoring has shown road decommissioning and storage treatments to be effective at reducing surface erosion, mass failure risk and soil bulk density while increasing water infiltration rates, vegetative ground cover and soil organic matter, compared to the roaded condition (Foltz 2007, Lloyd et al. 2010, USDA 1999-2009). Both action alternatives also include opportunities for decompaction and restoration of currently detrimentally disturbed areas of low productivity such as skid trails and landings.

Effects Specific to Alternative 2:

Alternative 2 has three units (5, 10, and 13) that would require specific design measures that set limits on the extent of new DSD to keep soils in the unit below the 15% DSD regional soil standard. New DSD from temporary road construction would be incorporated into the logging layout plan to keep DSD below the 15% standard. All temporary roads would have design features that would minimize soil disturbance and erosion potential (see design measures #7 and #9, chapter2). Temporary roads would be decommissioned after use to initiate recovery of soil productivity and stability. Restorative effects from temporary road decommissioning are expected to be similar to those described above for previous Forest road decommissioning (Foltz 2007, Lloyd et al. 2010, USDA 1999-2009).

Effects Specific to Alternative 3:

Alternative 3 has three units (5, 10 and 13) that would require specific design measures that set limits on the extent of new DSD to keep soils in the unit below the 15% DSD regional soil standard. No temporary roads are proposed in this alternative.

4. Cumulative Effects on Soil Productivity

Geographic Boundary: Within treatment unit boundaries, cumulative effects are assessed within the detrimental soil disturbance analysis, with effects of proposed activities limited to immediate treatment boundaries. Proposed temporary roads for accessing treatment areas are included in the calculation of detrimental soil disturbance for the unit that the temporary road accesses.

Time Frame: Compaction, displacement, and other detrimental soil impacts due to proposed activities can take several decades to dissipate to the point where recovery of productivity has occurred. Impacts from tree harvest and/or prescribed burning are considered to extend at least 20 years after the action. This analysis considers impacts from previous logging and mining and database and aerial photo information from the 1960s to the present.

Past, Present, and Foreseeable Future Actions: All past activities have been assessed as part of the existing condition and there are no present or future foreseeable activities planned in the analysis area that would contribute to cumulative effects.

Alternative 1 (No Action): There are no cumulative effects related to the No Action alternative since cumulative effects can only arise from the incremental impact of an action when added to other past, present, and reasonably foreseeable future actions. Since there are no actions associated with this alternative, there are no cumulative effects.

Alternatives 2 and 3: The cumulative effects of past and proposed activities was determined by adding the estimated disturbance from the project to past soil impacts. Potential cumulative DSD within each treatment unit are estimated to be between 2 and 15%, as shown in Appendix E.

C. Forest Plan Consistency

All units are expected to meet the Regional soil standard (FSM 2500-99-1) with implementation of the design measures listed in Chapter 2. Applicable Forest Plan standards listed on page II-33 of the Plan would be met, as follows:

Table 4.1 – Forest Plan Compliance

Standard Number	Subject Summary	Compliance Achieved By
a.	Manage activities on lands with ash caps such that bulk densities on at least 85 percent of the area remain at or below 0.9 gram/cubic centimeters.	Project design and mitigation measures to minimize soil disturbance. Post project monitoring to verify compliance and to assess if additional mitigation is needed. Treatment units were evaluated for disturbance using Regional standards and the USDA Soil Disturbance Monitoring Protocol. Soil improvement activities on areas with prior impacts to achieve a net improvement in soil productivity.
b.	Design resource management activities to maintain soil productivity and minimize erosion.	See Chapter 2 - design measures and mitigation measures.

Standard Number	Subject Summary	Compliance Achieved By
c.	Minimum coordinating requirements on land types with high or very high mass stability or parent material erosion hazard ratings are: (1) field verified, (2) road locations are reviewed by a team, and (3) road design mitigation would be staked.	Areas with high landslide hazard or high parent material erosion potential were assessed for soil stability in the field. Additional evaluations were made using landtype maps, GIS data and aerial photos. Project design measures were developed to avoid increased slope instability and to minimize excavation and disturbances in sensitive soils (Chapter 2).

II. Watershed (Ref: Lower Orogrande Project Watershed Report)

Direct and indirect effects areas were assessed at the 7th field HUCs; these are the lowest level at which effects would be seen. Some type of project activity occurs in each of the subwatersheds. The cumulative effects boundary includes the Lower Orogrande 6th field HUC (which is the entire 7th field HUCS combined) plus an additional 1,650 acres of the Upper Orogrande 6th field HUC. The Upper Orogrande 6th field HUC was not assessed separately due to limited harvest and road data on private/state lands. Forest Service lands amount to only 8% of the HUC and would have shown no measurable differences due to its small size. The 1,650 acres of project area that occurs in the Upper Orogrande HUC was instead added to the Lower Orogrande 6th field HUC analysis.

A. Analysis Methods

An Equivalent Clearcut Area (ECA) analysis using treatment and recovery coefficients from Ager and Clifton (2005) was used to determine existing and percent increase in ECA. The models were used to provide estimates for comparison of alternatives, not absolutes. Equivalent Clearcut Area is often used as an indicator of water yield and represents the amount of forest canopy openings in the watershed.

The ECA analysis was used to determine the percent increase in ECA from proposed project activities and included all harvest, slash treatment, and underburning, as well as skid trails, landing, and temporary roads. The analysis did not include roads for decommissioning, as they have already been accounted for in the existing condition.

The Disturbed WEPP erosion model (Elliot et. al. 2000) was used to predict sediment yield from harvest and prescribed burning activities. It estimates the amount and probability of erosion generated within activity units. It then predicts the amount and probability of sediment which may be delivered to streams. User-input variables include: climate, soil texture, slope, plant community, surface residue cover, and stream buffer slope and width.

The WEPP:Road model was used to predict the amount of erosion from temporary road and landing construction activities. It predicts the amount of sediment coming off the road prism and how much of that sediment leaves the buffer and enters streams. User-input variables include: climate, soil texture, road design (insloped/outsloped, etc…), road and fill slope, buffer width and length, and road surface type and level of use.

Field reviews of a variety of streams, roads and general landscape conditions were conducted by the Fisheries Biologist during 2009 and 2010. Google Earth was used to visually assess private/state lands upstream from the project area for their general condition for use in the cumulative effects analysis. Google Earth images were based on 2010 information and are therefore very recent.

B. Direct and Indirect Effects on Water Yield

Alternative 1 (No Action): Under this alternative, no proposed management actions would occur. Fire suppression, road maintenance, and recreation activities would remain at the current levels. Management related increases in peak flows would continue to decline over time as vegetation recovers from post-1970 harvest activities. Since no vegetation removal or ground disturbing activities would occur, there are no direct effects from this alternative.

Since all roads would remain in place, the indirect effects of the No Action Alternative would be that the ECAs due to roads would remain at current levels indefinitely.

Alternative 2: This alternative proposes 660 acres of regeneration harvest and 500 acres of commercial thinning. The effects of vegetative manipulation on water yield are complex, highly variable, and dependent on many independent factors such as elevation, climate, aspect, and especially precipitation. Removal of vegetation has the potential to increase streamflow in the short term (0-10 years) due to changes in evaporation, precipitation, wind patterns, and soil infiltration and percolation (Fowler et al. 1987, Dunne and Leopold 1978).

Slash treatment (broadcast burning or piling and burning) is proposed on the same 660 acres of regeneration harvest. The slash/burn treatment is another management practice that affects the hydrology of forested watersheds. Fire can have an effect on water quantity by removal of forest canopy and groundcover. The most important factors of the burn are: the severity of the fire on the soil surface, the steepness of the unit, and the soil type. Where measurable hydrologic responses occur following prescribed burning, they are greatest within the first year or two following a burn and then return to pre-fire levels (Beschta 1989). Slash treatments for the project units are expected to be of low severity on the soil, and vegetative ground cover would be re-established within 1-2 years (based on personal observations on other timber sales on the Forest).

The cumulative ECA (proposed actions added to the existing condition) for each of the subwatersheds was 0 to 12 percent, as displayed in Table 4.2. A measure of 20-30% ECA is generally recognized as the point where water yield is increased beyond acceptable limits (Gerhardt 2000). All proposed activities are within acceptable limits for water yield.

Table 4.2 – Percent increase in ECA from Lower Orogrande project activities

Drainage (7th field HUC)	**Watershed Acres**	**Existing ECA (2011)**	**Percent increase in ECA from harvest/burning/ temp road activities**	**Cumulative percent ECA after project activities**
Orogrande-Elk Creek	2,440 (92 are FS lands)	0.3%	0	0%*
East Fork Elk Creek	1,959 (1,350 are FS lands)	3%	9	12%
Elk Creek	666 (270 are FS lands)	2%	0	0%*

Drainage (7th field HUC)	Watershed Acres	Existing ECA (2011)	Percent increase in ECA from harvest/burning/ temp road activities	Cumulative percent ECA after project activities
Orogrande - Tamarack Creek	6,830	7%	3	10%
Shake Creek	1,754	5%	5	10%
Tamarack Creek	3,600	2%	2	4%
Hook Creek	1,583	6%	6	12%
Orogrande - Jazz Creek	5,149	2%	2	4%
Pine Creek	3,030	4%	4	8%

*cumulative ECA of 0% due to road decommissioning of all FS roads

Temporary Road Construction

Just over four acres of vegetation would be removed in order to construct temporary roads. This area is less than one percent of any of the 7th field HUC subwatersheds, and the increase in ECA from temporary road construction is negligible. Increase in peak flow from this activity is unlikely because of the very small area (< 5 acres) affected.

Alternative 3: This alternative proposes 600 acres of regeneration harvest and 430 acres of commercial thinning. Slash treatment (broadcast burning or piling and burning) is proposed on the same 600 acres of regeneration harvest.

Compared to Alternative 2, there are no differences in ECA for six of the subwatersheds, since harvest activities are the same and no temporary roads are needed or there are not enough acres to affect ECA (Tamarack Creek only). The ECA effects on the remaining three subwatersheds, where harvest and temporary road activities differ, are as follows:

Hook Creek **–** There is an ECA increase from project activities of 4% for a cumulative ECA of 10% for this subwatershed. This is 2% less than Alternative 2.

Orogrande - Tamarack Creek **–** There is an ECA increase from project activities of 2% for a cumulative ECA of 9% for this subwatershed. This is 1% less than Alternative 2.

Shake Creek **–** There is an ECA increase from project activities of 4% for a cumulative ECA of 9% for this subwatershed. This is 1% less than Alternative 2.

Since all cumulative ECAs are below 20-30%, all proposed activities under Alternative 3 are within acceptable limits for water yield.

C. Direct and Indirect Effects on Sediment Yield

Alternative 1 (No Action): Under this alternative, no proposed management actions would occur. Fire suppression, road maintenance, and recreation activities would remain at the current levels. Since no vegetation removal or ground disturbing activities would occur, there are no direct effects from this alternative.

The indirect effects of the No Action Alternative would be no changes in road density and road related erosion. Benefits from the reconditioning, reconstruction, and decommissioning of roads proposed in the action alternatives would not be attained. These roads could continue to be a source of sediment, especially at crossings, as well as intercepting and rerouting water to stream systems.

Alternatives 2 and 3: The Disturbed WEPP erosion model (Elliot et al. 2000) was used to predict the level of upland erosion produced from harvest (skid trails and landings), slash treatment, and underburning. The estimated erosion would be short term, with no erosion occurring two years after treatment (when ground vegetation had recovered). The amount of sediment entering streams based on 30-year climate simulation was also estimated. The following table displays the amount of modeled erosion and sediment delivery by drainage area:

Table 4.3 – Probability of Sediment Delivery from Treatment Units by Subwatershed*

7th Field HUC Subwatershed	Units	WEPP erosion (total tons)	Probability of erosion occurring first year after disturbance	WEPP sediment (total tons)	Probability of sediment delivery first year after disturbance
East Fork Elk Creek	1, 2, 8, 9	6.1	0-7%	1.3	0-7%
Orogrande - Tamarack Creek	3, 10, 11, 12, 13, 14, 15, 26	10.3	0-10%	1.8	0-10%
Shake Creek	4, 5, 6, 7	4.1	0-10%	0.9	0-10%
Tamarack Creek	25, 27, 28, 29	2.2	0-7%	0.8	0-7%
Hook Creek	16, 17, 18	3.5	0-7%	0.5	0-7%
Orogrande - Jazz Creek	20, 30	7.1	7%	1.7	7%
Pine Creek	19, 21, 22, 23, 24	13.2	0-7%	2.9	0-7%

In summary, the probability of sediment delivery is very low (less than 10%) and the time frame for delivery is short (approximately two years), as modeled by WEPP. WEPP accounts for INFISH buffer implementation but does not account for Best Management Practices implementation. These would further reduce potential erosion and limit the risk of sediment reaching streams. Any sediment yield increases would be short-term (0-5 years), and beneficial uses in Orogrande Creek and its tributaries would be maintained. Field observations of previously implemented timber harvest project shows no delivery of sediment to streams from harvest units (K.Smith, personal observations). No measurable increase in sediment to project area streams is therefore expected due to the very low probabilities of sediment yield increases when combined with local observations.

Temporary Road Construction (Alternative 2 only)

Twelve temporary roads would be constructed to access units 1, 3, 5, 6, 7, 14, 16 and 27. Temporary roads generate the most erosion when they are first constructed and lesser erosion would occur during the one to two years that they are open. It is expected that these roads would stabilize two years after decommissioning occurs

The effects from temporary roads would be short term (0 to 5 years), since they would be built, used, and decommissioned in a one to two year time period; are located on low gradient, dry ridges or upper slopes and are away from water with no stream crossings. Given these conditions, the WEPP:Road model (Elliot et al. 1999) predicted approximately eight tons of erosion being generated from the temporary roads, but with no sediment leaving RHCA buffers and entering streams.

Project design measures for temporary roads would minimize the erosion produced over the short life of these roads. For example, the temporary road would be closed to public motorized use during project activities, reducing the chance of increased erosion produced when vehicles drive on wet roads and rut surfaces. In addition, log trucks do not operate on temporary roads when they are saturated, which also reduces the chance of increased erosion and sediment delivery to streams.

Road Reconditioning and Reconstruction

About 24 miles of road reconstruction (22 miles under Alternative 3) and 9.5 miles of road reconditioning are proposed and are considered a beneficial effect to water quality. Work would include spot surface gravel placement and possible culvert repairs, replacement of about 52 culverts on perennial streams or seeps, or additional culvert installations to improve drainage. Surface graveling has been shown to be effective at reducing erosion from road surfaces, especially at road/stream crossings. Studies have found gravel reduces sediment by 70-79% (Burroughs and King 1989). Although this activity is designed to reduce sediment input over the long-term, a minor increase in sediment is expected to occur in the short term (one year). Installing additional cross drain culverts would divert roadside ditch flow onto the forest floor instead of directly into perennial streams where reconstruction activities occur. This would reduce the amount of sediment directly entering streams from ditches.

Road Decommissioning

Roads are the current primary source of erosion in the project area. Road erosion and sediment yield usually decline over time, but can continue at a chronic level indefinitely (USDA 1981). Road decommissioning activities would benefit water resources by reducing flow energy on roadbeds and within ditches, while reducing road-related sediment. Implementation of the proposed road decommissioning projects would remove culverts, which would improve streambank stability, width to depth ratio, and floodplain connectivity at these localized sites. This action provides a beneficial effect to the watershed by increasing water infiltration, increasing soil productivity, reducing potential for weed invasion, and stabilizing bare slopes.

Road decommissioning would produce short-term and minor amounts of sediment to the smaller tributaries that bisect the roads. Sediment would come from within the streambed and banks and would be delivered for about 1 hour at each site when stream crossings are removed. Sediment, in the form of increased turbidity, would travel no more than 300-500 feet downstream (Clearwater NF Forest monitoring, unpublished data). Stream channel stabilization would occur over a period of two to three years. The implementation of BMPs such as straw bales, slash and erosion mats would minimize the risk of sediment entering streams from disturbed soils outside of the streambed.

Design criteria and BMPs would be applied to each of these activities to minimize sediment delivery to stream channels. Road decommissioning may produce short-term (0 to 3 years) and localized sediment, but it would produce both immediate and long-term recovery benefits.

Openings Greater than 40 acres in Size

The benefit to both Watershed and Fisheries from allowing Unit 2 to retain its proposed 64 acres is the removal of roads on the landscape. This unit has interior roads that cross several streams. These roads are needed for harvest activities and are proposed for decommissioning after the timber sale. By retaining the proposed acres, decommissioning would occur, and the restored acreage would return to a forested condition.

D. Direct and Indirect Effects on Road Density

Alternative 1 (No Action): Since no proposed management actions would occur, there are no direct effects from this alternative. The indirect effects of the No Action Alternative would be no change in road density.

Alternatives 2 and 3: Based on field review of road conditions and an interdisciplinary roads analysis, about 16 miles of system road and 73 miles of non-system road are proposed for decommissioning. This is an overall reduction of 40% of the roads in the project area leading to a project area density of 3.6 mi/mi^2 (Table 4.4). Decommissioning would put 352 acres back into a productive forested state and provide an improvement in the overall watershed condition. Two of the watersheds would move from moderate to good condition, two would remain in the moderate category and the remaining 5 would remain in the poor condition but with greatly reduced densities.

Table 4.4 - Road Decommissioning by subwatershed

7th Field HUC Subwatershed	Square miles (FS only)	Existing Road miles	Existing road density (mi/mi^2)	Proposed decommissioning (miles)	Road density after project implementation (mi/mi^2)
Orogrande-Elk Creek	0.14	2	14.2	2	0
East Fork Elk Creek	2.1	15	7.1	6	4.3
Elk Creek	0.4	3	7.1	3	0
Orogrande - Tamarack Creek	10.7	93	8.7	38	5.1
Shake Creek	2.7	23	8.5	13	3.7
Tamarack Creek	5.6	14	2.5	2	2.1
Hook Creek	2.5	25	10	11	5.6
Orogrande - Jazz Creek	8	19	2.4	7	1.5
Pine Creek	4.7	29	6.2	7	4.7
Project Area	36.8	223	6.1	89	3.6

E. Cumulative Effects

Geographic Boundary: The extent of cumulative watershed effects is dependent on the scale of the watershed. The magnitude of changes in water and sediment yield is inversely proportional to stream order (MacDonald 1989), so detectable changes are expected at smaller scales. Assessments at the 5th field HUC (the entire Orogrande drainage) would not show noticeable effects due to dilution of effects at that scale. The cumulative effects area is therefore analyzed at the project area boundary level (Lower Orogrande drainage). Activities on adjacent private lands upstream from the project area were qualitatively considered since limited data on past or current harvest and road miles was available. Data provided by the State of Idaho Lands Division showed 808 acres of ongoing or proposed timber harvest and 2.3 miles of road construction within the next three years. In addition Google Earth photos were used to generally assess the presence of open areas (clearcuts) and roads on private lands. The area appears to be well vegetated with no evidence of road failures or large areas of recent clearcuts. Current information shows that cobble embeddedness levels in the mainstem of Lower Orogrande Creek meet Forest Plan desired conditions. It is therefore assumed that private lands in Upper Orogrande are not contributing sediment in measurable amounts; otherwise levels would be expected to exceed desired conditions. Private/state lands were not considered for ECA due to a lack of stand age information and the lack of observed effects downstream. High ECAs can increase water yield (stream volumes) which can cause streambanks to erode and become destabilized. Stream surveys on Forest lands downstream showed very stable and well vegetated banks indicating no effects from upstream areas, including private/state lands.

Time Frame: The temporal scope for watershed effects is 1960s to 2038. The beginning of scope is based on when harvest and road construction activities in the watershed first began. Evidence from those events is still noticeable on the landscape in the form of old skid trails, landings, and the current road system. The scope continues to year 2038, which is approximately 24 years after project implementation and the amount of time estimated for percent increase in ECA to return to zero.

Past, Present, and Foreseeable Future Actions: Harvest and associated road building activities have occurred throughout much of the Lower Orogrande drainage. Early timber sales conducted between the early 1960s and late 1980s resulted in widespread and persistent negative impacts, because they involved new road construction, little to no tree retention in regeneration harvest areas, and riparian harvest (including the clearcutting of headwater tributaries). These activities caused increased sedimentation; reduced woody material recruitment important for aquatic habitat development; increased water temperature caused by harvest in riparian areas; and increased water yields due to large areas of clearcuts.

Forest practices have changed over the last two decades. Project design measures, Best Management Practices on both federal and state/private lands, and Forest Plan guidelines have been developed in order to reduce ground disturbing activities and subsequent sediment delivery. Operating under dry conditions, implementing INFISH buffers, retention of trees in regeneration harvest units, and limiting ground based yarding to slopes less than 35% are now common practices. Currently, peak flows are below recognized limits and sediment yields are within Forest Plan standards.

Approximately 34 miles of road have been decommissioned in the Orogrande-Jazz and Pine Creek subwatersheds since 1996. This activity produced localized short-term sediment during implementation, but created long-term sediment reductions and benefits to overall channel conditions.

Present actions include recreation use, fire suppression, and road maintenance. Recreational activities produce little to no measurable impacts to water quality or quantity or floodplain/wetland functions.

Most effects from recreation are primarily due to associated road use, especially during wet conditions. Only minor needed improvements were noted during field reviews of the Clark Mountain OHV Trail. Fire suppression activities are infrequent and limited in size, and road maintenance has minimal short-term effects and long-term benefits (Burroughs and King 1989). Based on field reviews in the area, recreation use, fire suppression, and road maintenance have no measurable effect on sediment yield, ECA, or road density. They are therefore not expected to meaningfully add to cumulative effects.

Alternative 1

Cumulative effects arise from the incremental impact of an action when added to other past, present, and reasonably foreseeable actions. There are no foreseeable future activities in the area that would affect road density, ECA, or sediment yield. There are no direct effects from this alternative, and the indirect effects from roads would not change. There would be no cumulative effects since there are no other activities that, when combined with this alternative, would measurably increase ECA, sediment yield, or road density.

Alternatives 2 and 3

Water Yield: For federal lands, the estimated increase in percent ECA from project activities is 4 percent for the entire project area. When added to the existing condition, the cumulative ECA is 9 percent, which is within the high (good) watershed condition rating, and well below the 20-30% threshold. Harvest activities on state lands would increase ECA by 2%. It would not increase water yield above threshold levels.

No stream channel alteration is expected from the Lower Orogrande project based on results from the ECA analysis and implementation of project design measures. There would be no direct effect or indirect effects, therefore there would be no cumulative effects to water yield based in ECA.

Sediment Yield: The WEPP model was used to estimate the amount of sediment produced from temporary roads, harvest units, slash treatment, and underburning. Although some sediment delivery was predicted, design measures, INFISH buffers, and moderate burn prescriptions would reduce the likelihood of sediment delivery. The probability of sediment delivery was estimated to be less than 10%. Proposed activities on state lands would be minimal relative to the large size of the watershed and dispersed over four different stream systems. Required BMPs would also be implemented on these sales. The effects from state land activities are therefore not expected to increase the probability of sediment delivery to streams. Because direct and indirect effects are predicted to be minimal, there would be no cumulative effects to sediment yield.

The Forest Plan sediment guidelines were established to reflect the sediment-carrying capacity of a stream system. The maximum sediment load and stream flushing ability is represented by the maximum sediment yield percent over natural found in the Forest Plan guidelines in Appendix K. As discussed earlier, Lower Orogrande, Pine, and Tamarack Creeks currently meet Forest Plan standards for sediment. Based on the predicted amount of activity generated sediment and the very low probability of that occurring, this project would continue to meet Forest Plan standards and would comply with the Lawsuit Settlement Agreement for causing no measurable increase in sediment. Road decommissioning, culvert replacement and road reconstruction activities are designed to reduce sediment inputs into streams and would improve conditions over time. These activities would help to meet Forest Plan desired conditions for healthy streams.

Based on the implementation of project design measures and adherence to Idaho Best Management Practices, the Lower Orogrande project would produce no measurable increase in any pollutants and therefore would have no impacts to Lower Orogrande Creek beneficial uses.

Road Density: Cumulatively, road densities would decrease by 3.7 mi/mi^2 over the project area. This is a reduction of 123 miles or 48% of the roads when added to previous road decommissioning activities. There would be a positive cumulative effect on road densities as a result of the project. The construction of 2.3 miles of road on state lands would negligibly increase road densities in the drainage.

Consistency with Forest Plan and Environmental Law: Forest Plan standards for water (pages II-27-29) apply to this project and would be met as displayed in the following table:

Table 4.5 – Compliance with Clearwater National Forest Plan Water Standards

Standard Number	Subject Summary	Compliance Achieved By
8a.	Secure favorable condition of flow by maintaining the integrity and equilibrium of all stream systems.	No increase in peak flow and low probability of sediment input, so channel processes would not be altered.
8b.	Manage water quality and stream conditions to assure management activities do not cause permanent or long-term damage to beneficial uses.	No increase in peak flow and short-term sediment input for long-term benefits. Beneficial uses would be maintained.
8c.	Apply BMPs to project activities to ensure water quality standards are met or exceeded.	BMPs listed in Appendix C will be implemented.
8d.	Manage all waters under a basic standard.	Project managed for appropriate standard. INFISH buffers and BMPs will minimize effects to streams. All streams are within Forest Plan sediment yield standards.
8e.	In addition to standard d., manage all watershed systems considered important for the fishery resource based on 1) No effect, 2) High Fishable, 3) Moderate Fishable, 4) Low Fishable, and 5) Minimum Viable.	
8g	Design, schedule and implement management activities that would: (1) maintain water quality and stream conditions that are not likely to cause sustained damage to the biological potential of the fish habitat; (2) not reduce fish habitat productivity in the short-term below the assigned standard; (3) maintain water quality in a condition that is not likely to inhibit recovery of the fish habitat; and (4) require a watershed cumulative effects analysis	Watershed improvement projects, project design measures listed in Chapter 2, and BMPs listed in Appendix C would maintain or improve water quality, channel conditions, and fish habitat. A cumulative watershed effects analysis was completed for this project.
8k.	Conduct nonpoint source activities in accordance with applicable BMPs as referenced in *Idaho Water Quality Standards and Wastewater Treatment Requirements* and *Soil and Water Conservation Handbook.*	BMPs listed in Appendix C would be implemented.

III. Fisheries (Ref: Lower Orogrande Project Aquatic Habitat/Fisheries Report)

As done for the watershed analysis, the direct and indirect effects areas for fisheries are assessed at the 7th field HUCs; these are the lowest level at which effects would be seen.

A. Analysis Methods

A Geographic Information System (GIS) map using local Forest data was used to generate road mileages and stream crossing locations, and fish distribution. Field reviews of a variety of streams, roads and general landscape conditions were conducted during 2009 and 2010. Stream crossings were marked and a map created using a Geographic Positioning System (GPS) unit for much of the area. Stream crossing and road conditions were also recorded. This information was used to summarize the current condition and to help determine priorities for proposed treatments. Google Earth imagery from 2010 was used to qualitatively assess forested conditions in project area drainages as well as activities on private lands upstream from the project area.

B. Direct and Indirect Effects

Alternative 1 (No Action): There would be no logging, road decommissioning, and no culvert replacement or removal under this alternative. Any watershed improvement activities (culvert replacements, road decommissioning) would require additional NEPA analysis prior to implementation. There would be no *direct effects* to streams from the No Action alternative, since no stream channels or streamside areas would be disturbed. The *indirect effects* would include the following:

- Roads that may be contributing sediment to streams would continue to do so until funding is obtained and further NEPA is completed. Roads no longer needed for management (decommissioning candidates) could potentially deliver sediment into streams through road surface erosion; however roads within the project area are currently showing little signs of erosion. The culvert failure risk is moderate on these roads due to the steep topography and the fact that many of the roads still contain log culverts which are aging or have already partially failed. Most are still constricting streams at the crossings increasing the risk of failure. The greatest risk for failure is on that portion of Road 660 which failed in the past and will likely do so again in the near future. This is a very high risk site that would not be decommissioned but would still require maintenance to try and prevent future failures. Roads deemed needed for management could continue to add sediment to streams through roadside ditches and culverts.
- There would be no management-related change, either positive or negative, from the existing aquatic habitat condition. Instream and riparian processes of habitat development and wood recruitment would continue in the project area. Riparian habitat conditions would continue to improve as trees grow and age, continuing to provide shade and large woody debris to streams.
- Stream temperatures would likely decrease as riparian vegetation continues to grow where timber harvest had previously occurred.
- Culvert barriers would continue to exist preventing access to 11.5 miles of historic and refuge aquatic habitats until removal/replacement funding is obtained and additional NEPA is completed. Local aquatic populations would remain restricted due to these barriers.

This alternative would inhibit the ability of the Forest to limit or reduce sediment delivery to streams in order to meet Forest Plan desired cobble embeddedness levels. This alternative would allow for continued stream temperature recovery on federal land which would help to meet the TMDL over time. This alternative would not affect the Idaho State standard for cold water aquatic life or secondary contact recreation.

Alternatives 2 and 3: There would be no direct effects to fish or their habitat as a result of timber harvest or small tree thinning activities from either action alternative due to INFISH buffer retention. All vegetation would be retained with the 25' no thinning zone adjacent to streams. Data has shown that buffers are adequate to prevent sediment input into streams (BNF 2006; FEMAT, 1993). All potential instream and riparian woody debris would be retained and no streamside vegetation would be removed. Small tree thinning would aid in retaining preferred, long-lived species within RHCAs, particularly western redcedar. No disturbance would occur in riparian areas or stream channels during timber harvest. INFISH Riparian Management Objectives (pool frequency, water temperature, large woody debris, bank stability, lower bank angle, and width:depth ratio) would be maintained.

Road decommissioning would remove 25 miles of roads from RHCAs. It returns 100 acres of RHCA back into a forested state under both action alternatives. This is a 43% reduction in RHCA road miles.

Both action alternatives remove 137 stream crossings through road decommissioning. This is a 44% reduction in stream crossings. Fourteen of the removed culverts are on fish bearing streams which would improve access to five miles of currently restricted aquatic habitat. Both alternatives also replace 16 culverts and add three new culverts that would allow for aquatic organism passage. Once road decommissioning and culvert replacement activities are completed, no human-caused barriers to upstream fish passage would remain in the project area.

Instream activities during culvert removal or replacement would introduce locally measurable amounts of sediments immediately downstream of the culvert site. The sediments and increased turbidity levels would settle out downstream; the distance is expected to be less than 300 feet due to small stream size and low flow during the dry season when work would occur. This may degrade substrate conditions as fine sediments deposit over existing gravels. Sediment input would occur over a short time frame (1-5 days per site). The direct affect to cutthroat trout are considered negligible since fish can move downstream to avoid high turbidity if necessary. Fish could be killed during culvert excavation and removal activities on the fish bearing streams. The risk is moderate for cutthroat and low brook trout based on densities near the culvert sites. Dewatering the sites prior to conducting activities greatly reduces the risk. There would be no direct effects to fish at sites on non-fish bearing streams since no fish are in the vicinity. There would be a direct benefit to all aquatic species where culverts are removed or replaced by providing unimpeded upstream passage to 11.5 miles of habitat and by reducing the risk of sediment input from crossing failures.

Culvert replacement and removal would directly affect riparian vegetation at each site. Vegetation removal, primarily shrubs and small trees, is unlikely to cause stream temperature increases due to the small amount of area affected (usually less 0.1 acre per site) and the large number of streams over which the work would be conducted. The majority of sites are well shaded either by vegetation outside of the proposed construction zones or by hillslopes (topographic shading). No measurable change to stream temperatures is expected.

There would be no effects to streams or fish from temporary road construction activities as all occur on or near ridgetops and all would be decommissioned after use. There are no mechanisms that would deliver sediment into stream channels. There would be no negative effects to stream channels or fish from road reconditioning activities.

The *indirect effects* of decommissioning roads would be the removal of culverts and fill material associated with them, thus eliminating the risk of failure at crossings and sediment input into streams over the long term. This is especially true on the high risk section of Road 660. This could lead to a reduction in sediment levels in project area streams over time. Surfacing and/or adding additional drainage to Road 677 would also help to reduce sediment input into area streams.

Both action alternatives would reduce sediment delivery to streams through road improvements or removals. Additional cross drain culverts installed as a result of road reconstruction activities would reduce the amount of sediment entering perennial streams from road surfaces and roadside ditches. New culverts would be placed to intercept ditchline flow and divert it onto the forest floor. This would route road surface and ditchline sediment away from stream channels. The risk of sediment entering streams would be almost non-existent based on preliminary monitoring of similar pipes in the Fan Creek drainage (personal observation, 2008). Monitoring showed that only 1 out of 37 pipes routed ditchline flow down the forested slope and into a stream channel. A different design on the one pipe would have prevented any routing to the stream. The remaining pipes routed sediment for an average of 40 feet downslope from the culvert outlet with no delivery to streams. This would allow for a continued improving trend that could help to meet Forest Plan desired sediment levels in Lower Orogrande tributary streams. The retention of INFISH buffers on timber harvest units would allow for stream temperature maintenance or recovery. This would allow the area to continue the trend towards meeting TMDL targets. It would also help to meet cutthroat spawning and rearing temperatures over time.

C. Cumulative Effects

Geographic Boundary: The cumulative effects analysis area is the Lower Orogrande watershed within the project boundary. This area includes the potential effects of past, present, and proposed activities on federal lands. It only qualitatively includes private lands in Upper Orogrande Creek since detailed information is limited for past activities such as timber harvest and road densities. In addition the project has been designed to have no measurable effect on sediment or temperature; therefore when combined with private activities, no measurable cumulative effect from either action alternative is expected.

Time Frame: The timeframe considered for cumulative effects is 2013 to 2020. This is the timeframe from when project activities would begin until two years after they are expected to be completed. Culvert replacements would likely take up to five years to complete. An additional two years was added to account for the expected amount of time it would take for shrubs and ground cover to respond following decommissioning and culvert replacement activities. The growth of shrubs and other ground cover limits overland flow of sediment.

Past, Present, and Foreseeable Future Actions: The existing condition includes all past road building and decommissioning activities through 2010. Past timber harvest was not considered, since all sales in the last 15 years retained INFISH buffers, in which no measureable sediment is expected based on Forest BMP audits and informal monitoring.

Present and foreseeable future actions considered include: (1) the OHV use of Trail 604 that has both culverted and live water stream crossings; (2) the Lower Orogrande OHV Trail project that may increase OHV use on Trail 604; and (3) recreational and administrative use of Forest Road 250 along Orogrande Creek due to its potential to generate sediment. There are no other present or future foreseeable activities that could affect sediment, road density, or aquatic passage.

Alternative 1 (No Action): There are no cumulative effects related to the No Action alternative since cumulative effects can only arise from the incremental impact of an action when added to other past, present, and reasonably foreseeable future actions. There are no present or foreseeable actions associated with this alternative that would affect road density in RHCAs or aquatic barriers.

Alternatives 2 and 3: Surveys were conducted on 9.5 miles (92%) of Trail 604. There are 31 perennial streams or small seeps that cross it. Twelve crossings contain culverts and the remaining are open water crossings that are hardened with geobrick material in the stream and on the approaches leading to the stream. Although minimal impacts to streams from OHV use were observed, crossing treatments were identified and prioritized at 19 of the sites. Treatment sites included one high priority, three moderate priority, and 15 low priority sites. Three low priority sites and one moderate priority site need culvert replacements, and 11 sites need erosion control through the extension of geobrick material further up the crossing approaches. Proposed use of the trail for timber sale haul under the Lower Orogrande project would improve five of these sites (one moderate and four low priority) by installing culverts at the crossings.

The Lower Orogrande OHV Trail project proposes to open up two miles of Forest Road 5209-A and 670-A to OHV use within the project area. The trail crosses only one culverted stream. The greatest potential impact is the likely increase in OHV use on Trail 604. The trail project would tie into Trail 604 and provide a large loop for OHV travel within the project area. Additional use of Trail 604 increases the likelihood of more erosion on the trail approaches at stream crossings. However, it is expected that culvert replacement/installation and erosion control work along Trail 604 would improve conditions at the crossings which would further reduce erosion risk from the existing condition. The retention of culverts on the Cache and Shake Creek crossings with the Lower Orogrande project should virtually eliminate sediment delivery into these fish bearing streams. Therefore, the potential increased use from the Lower Orogrande OHV project would not likely result in additional sediment entering tributary streams along Trail 604.

Recreational and administrative use of Forest Road 250 is high during the summer and fall months. It is one of two primary roads that access the North Fork Clearwater River drainage. The road is graveled but becomes dusty from July through August when weather conditions are dry and rain is scarce. The airborne dust clings to vegetation on the road sides and accumulates until rains wash it off. However, the fill slopes and ditchlines along Road 250 are well vegetated, minimizing the amount of sediment entering Lower Orogrande Creek. A study conducted by Burroughs (1985) in Idaho used simulated rainfall to generate runoff and sediment yield from forest roads, ditchlines, and fillslopes. He found that gravel reduced sediment yield by a factor of four when compared to no surfacing. He also found that where there was dense grass cover on the fillslopes of the road, sediment yield was reduced by 99%. Thus, recreational and administrative use is not likely contributing large quantities of sediment to Orogrande Creek, which is supported by the low cobble embeddedness levels that meet Forest Plan standards.

Proposed harvest activities on state lands within Orogrande include 808 acres of proposed timber harvest and 2.3 miles of road construction. These activities are distributed over four different stream systems and represent 4% of all state and private lands in the Orogrande drainage (see map in Appendix A). It is not clear as to whether any new stream crossings would be constructed under their sales; however a review of Google Earth reveals that roads are in place in the proposed harvest areas. It appears as if no new crossings would be needed and no decommissioning is proposed on state lands. The state would also implement required BMPs to minimize the input of sediment to streams; therefore no effects from activities on state lands would be expected.

Cumulative effects can only arise when effects from the proposed action are combined with past, present, and foreseeable actions. Since the Lower Orogrande project would have only minimal direct or indirect effects related to sediment, there would be no negative cumulative effects when combined with the use of Trail 604, Forest Road 250, the Lower Orogrande OHV Trail, or harvest and road building activities on state lands. There would be positive cumulative effects to sediment reduction and aquatic species and their habitat as a result of culvert replacement, road reconstruction, Trail 604 improvements, and road decommissioning activities. No measurable negative cumulative effects to instream sediment are expected as a result of either action alternative when combined with other projects.

D. Regulatory Compliance

Endangered Species Act: The project complies with ESA in that there would be no affect to bull trout or designated critical habitat. Very few bull trout have been observed in the Orogrande drainage and the proposed activities would not directly or indirectly affect the species. The project would allow for temperature and instream sediment reduction over time and would increase access to potential habitat through culvert replacements. This would allow for bull trout expansion into currently restricted streams in the project area. Activities would not directly affect bull trout as none occur near road decommissioning or culvert replacement sites.

INFISH: The project complies with INFISH in that the project would not retard the attainment of Riparian Management Objectives for bank stability, width to depth ratio, instream large woody debris, pool frequency, or water temperature. Project activities would allow for improvement in large wood, pool frequency, and water temperature overtime. Bank stability would be maintained throughout the drainage. Road decommissioning and culvert replacement activities would help to maintain stability over the long term by eliminating future crossing failure risks. Stream crossings can destabilize banks downstream for thousands of feet if when they fail.

Clean Water Act (TMDL): The action alternatives comply with the IDEQ TMDL in that stream temperatures would not increase as a result of project activities. Riparian vegetation would continue the trend towards meeting the TMDL stream shading targets.

Clearwater National Forest Plan: The action alternatives comply with the Forest Plan and Settlement Agreement as “no measurable increase” in sediment would occur. Streams would be able to continue to trend toward meeting desired conditions for stream temperature, cobble embeddedness, large wood, pool frequency and pool quality over time. Road decommissioning, road reconstruction, and culvert replacement activities would reduce the risk for future input of sediment to streams.

IV. Wildlife (Ref: Lower Orogrande MIS & TES Wildlife Resources Status Report)

This section discusses the effects of management activities on the habitat of wildlife species listed in Chapter 3.

A. Threatened Species

Canada Lynx

1. Direct and Indirect Effects

To characterize existing habitat resources, three separate analyses were done. The first was a calculation of lynx habitat not limited by LAU boundaries. Identical model selection criteria were used as in the previous lynx habitat modeling effort on the Clearwater National Forest. The second was a calculation of lynx habitat not limited by LAU boundaries at all elevations, not just above 4000 feet, with the reasoning that when transient lynx move between areas of suitable habitat, they may be unlikely or unable to limit their movement to high elevation areas only. The third calculation was based solely on tree canopy cover to provide the broadest characterization of existing habitat resources potentially suitable for lynx movement through the area.

Each analysis was done at two scales: the first being the action area and the second a greater area defined by all of the area within 5 miles of the project boundary. A 5-mile buffer was chosen to approximate the lynx movement rate, which in Squires (2013) study averaged 6.9 km per day, or 4.3 miles. The resulting spatial models were mapped to show the distribution of potential habitat for dispersing lynx, and the acres were tabulated by habitat type for the first and second analysis, and by tree canopy cover for the third analysis. In order to evaluate the impacts of project related activities on lynx movement, the acres that would be affected by the project were also tabulated and the percent change in habitat type or tree canopy cover was calculated.

After the Record of Decision (2013), six harvest units were dropped from proposed treatment due to soil stability. Thus, only those units remaining were analyzed. Temporary road construction would occur within the treatment units, therefore their effect to habitat or forested cover is not separate from the effect of the treatment unit. Non-Forest Service lands were not included in the analysis to characterize existing dispersal habita,t since the continued existence of habitat on non-Forest Service lands is unpredictable. Thus, the dispersal habitat used in this analysis is under Forest Service jurisdiction. The following tables display the results of each analysis:

Table 4.6 - Lynx habitat above 4000 feet elevation within Lower Orogrande Project Area

Modeled Lynx Habitat	Acres	% Project Area	Regen Acres	% Change of Habitat	Comm Thin Acres	% Change of Habitat	Pre-Comm Thin Acres	% Change of Habitat
Denning	1,266	5.9	24.0	-1.9	0	0	0	0
Foraging	1,428	6.6	42.4	-3.0	54.5	-3.8	0	0
Total Habitat	2,694	12.5	66.4	-2.5	54.5	-2.0	0	0
Project Area	21,560		66.4	-0.31	54.5	-0.25	0	0

Table 4.6a - Lynx habitat above 4000 feet elevation within 5-mile buffer.

Modeled Lynx Habitat	Acres	% Total Area	Regen Acres	% Change of Habitat	Comm Thin Acres	% Change of Habitat	Pre-Comm Thin Acres	% Change of Habitat
Denning	9,965	8.5	24.0	-0.24	0	0	0	0
Foraging	14,431	12.3	42.4	-0.29	54.5	-0.38	0	0
Total Habitat	24,396	20.8	66.4	-0.27	54.5	-0.22	0	0
Total FS Acres	117,319		66.4	-0.06	54.5	-0.05	0	0

Table 4.6b - Lynx habitat all elevations within Lower Orogrande Project Area

Modeled Lynx Habitat	Acres	% Project Area	Regen Acres	% Change of Habitat	Comm Thin Acres	% Change of Habitat	Pre-Comm Thin Acres	% Change of Habitat
Denning	1,592	7.4	68.4	-4.3	0	0	0	0
Foraging	2,944	13.7	62.9	-2.1	85.6	-2.9	31	-1.05
Total Habitat	4,536	21.0	131.3	-2.9	85.6	-1.9	31	-0.68
Project Area	21,560		131.3	-0.61	85.6	-0.40	31	-0.14

Table 1.6c - Lynx habitat all elevations within a 5-mile buffer

Modeled Lynx Habitat	Acres	% Total Area	Regen Acres	% Change of Habitat	Comm Thin Acres	% Change of Habitat	Pre-Comm Thin Acres	% Change of Habitat
Denning	13,691	11.7	68.4	-0.50	0	0	0	0
Foraging	23,125	19.7	62.9	-0.27	85.6	-0.37	31	-0.13
Total Habitat	36,816	31.4	131.3	-0.36	85.6	-0.23	31	-0.08
Total FS Acres	117,319		131.3	-0.11	85.6	-0.07	31	-0.03

Table 4.6d - Change in canopy cover (from VMAP) within Lower Orogrande Project Area

Canopy Cover	Acres	% Project Area	Regen Acres	% Change Canopy Cover	Comm Thin Acres	% Change Canopy Cover	Pre-Comm Thin Acres	% Change Canopy Cover
>60%	8,580	39.8	193	-2.25	76	-0.88	126	-1.47
40-59%	5,859	27.2	155	-2.65	207	-3.53	208	-3.55
25-39%	1,700	7.9	20	-1.18	15	-0.88	76	-4.47
10-24%	3,833	17.8	30	-0.78	103	-2.69	80	-2.14
Other	1,588	7.3	0	0	19	-1.20	170	-10.7
FS Total	21,560	100	398	-1.85	420	-1.95	660	-3.07

Table 4.6e - Change in canopy cover (from VMAP) within a 5 mile buffer

Canopy Cover	Acres	% Project Area	Regen Acres	% Change Canopy Cover	Comm Thin Acres	% Change Canopy Cover	Pre-Comm Thin Acres	% Change Canopy Cover
>60%	58,444	49.8	193	-0.33	76	-0.13	126	-0.22
40-59%	20,725	17.7	155	-0.75	207	-1.00	208	-1.00
25-39%	8,123	6.9	20	-0.25	15	-0.19	76	-0.94
10-24%	17,731	15.1	30	-0.17	103	-0.58	80	-0.46
Other	12,296	10.5	0	0	19	-0.16	170	-1.38
FS Total	117,319	100	398	-0.34	420	-0.36	660	-0.56

The project area contains 21,560 acres, of which 398 acres would be regeneration harvested, 420 acres would be commercially thinned, and 662 acres would be pre-commercially thinned. That is a total impact on 1,480 acres, or approximately 7% of the area. The project area plus a 5-mile buffer contains a total of 117, 319 Forest Service acres, and the change of 1,480 acres represents a less than a 2% change to current vegetative structure. The impact to actual lynx habitat in the project area is 121 acres, or approximately 4.5% of available habitat. None of this habitat exists within an LAU, but as noncontiguous habitat fragments, and would not impact the ability of a female lynx to establish a home range in the LAUs that are within several miles of this area.

The average canopy closure on stands to be commercially thinned is about 80%. While the 420 acres to be commercially thinned would still retain some canopy cover immediately post treatment, it is not possible to estimate the effect of this treatment on lynx movement or quality of habitat. Therefore, these acres were considered to be not habitat or forested cover post treatment, understanding that is an overestimate of effects. Also, the duration of effects for commercially thinned stands would only be about 5-10 years, as the canopy closure would have recovered by that time.

The proposed project would not considerably reduce suitable conditions for lynx. Given that the total amount of acres treated in the action area and within a 5-mile buffer of the action area is a small percentage of the total available habitat and forested cover, the impact of the project on lynx should be minimal. After the project is implemented, there would still be sufficient habitat to allow lynx movements within, through, and adjacent to the action area and avoid forest openings.

The potential for a transient lynx to be present while implementation is occurring is extremely low. Should a transient lynx happen to be present in the vicinity during project activities, there is sufficient adjacent habitat available for lynx to avoid the action area. In addition, lynx are considered to be generally tolerant of human presence and activities (Ruediger et al. 2000, p. 1-13). Direct effects could be related to disturbance to individual lynx, causing lynx to avoid the area during implementation. This would not significantly interrupt critical life history factors such as foraging for food, due to the difference in activity periods since lynx primarily forage at night or crepuscular periods.

2. Cumulative Effects

Although the Lower Orogrande project area consists of entirely National Forest lands, there are 37,130 acres of state and private lands within the 5-mile buffer around the project. Activities on these lands would include private land development such as the construction of buildings and roads, timber harvest, and potentially mining (refer to Appendix A). Regardless of actions on state or private lands within the 5-mile buffer of the project, there would still be sufficient habitat on Forest Service lands to facilitate lynx movement through the area.

Statement of Findings

The proposed federal action described for the Lower Orogrande project **"may affect, but is not likely to adversely affect"** the Canada lynx and/or its habitat. This determination is based on:

a. The impact to noncontiguous, fragmented, small habitat patches outside of an LAU will not significantly impact the ability of a female lynx to establish a home range within the larger blocks of habitat in the LAUs that are within several miles of the project. These small, noncontiguous fragmented patches were not sufficient to establish an LAU in the original lynx mapping.
b. Travel habitat for transient or dispersing lynx would be maintained across the action area and within the 5-mile buffer around the action area, therefore no long-term impacts to individual lynx and their habitat are anticipated.
c. If transient lynx are present, negligible, short-term direct effects may occur related to disturbance (noise and mechanize equipment) during implementation of vegetation treatment.
d. Forest roads generally have low speeds and are gravel, and do not pose a threat to lynx. No permanent road construction is proposed. Any new temporary roads will be constructed within the treatment units; therefore the effect to habitat and forested cover is not separate from the effect of the treatment units.
e. Lastly, the proposed Federal actions are not occurring within designated critical habitat, so the project would have no effect on critical habitat.

B. Management Indicator Species

1. Elk

This section addresses how well each alternative would progress toward the desired conditions for elk summer and winter range and the attributes associated with each.

a. Direct and Indirect Effects on Summer Range

Alternative 1: This alternative would cause no direct or indirect effects to elk summer habitat effectiveness. Mean potential elk habitat effectiveness for the five elk analysis units (EAUs) would remain unchanged at 48%, which is above the Forest Plan standard of at least 25%. However, forage habitat, currently at 1,540 acres (7% of the 21,500 acres of elk summer habitat residing within the five EAUs) would remain limited throughout the summer range and would continue to decline due to advancing forest succession. Since standard open-road density would remain at 1.7 mi/mi^2, there would be no change in the approximate 1,200 acres of elk security habitat, which is considered very low in many parts of the analysis area.

Alternatives 2 and 3: Both alternatives would decrease the mean for elk summer habitat effectiveness in the five EAUs to 47%. Forage habitat created in regeneration harvest units would increase by approximately 350 and 110 acres, respectively, and comprise 9% of the elk summer habitat landscape. Although standard open-road density would increase to 1.8 mi/mi^2, as the result of creating new openings along system roads, elk security habitat would increase by approximately 3,000 to 3,600 acres (13 to 15% of the total summer habitat landscape in the analysis area) as a result of proposed year-round road restrictions primarily in the Tamarack Creek area. Elk security in the Cache, Hook and Larch/Pine EAUs would remain relatively unchanged.

Effects of Openings Greater than 40 acres in Size: The most impactive component of regeneration harvest Unit 2 would be the local reduction of big game hiding cover. However, approximately 80% the area would continue to provide hiding cover. Within 10 to 15 years, following prescribed fire, big game hiding cover would be expected to recover in the regeneration harvest units.

The most beneficial short-term component of planned regeneration harvest would be increased big game forage opportunities. The availability of quality big game forages would be expected to persist two to three decades following prescribed fire. The most beneficial long-term component of the planned regeneration harvest would be the development of larger patches of mature forest habitats and big game hiding cover.

b. Direct and Indirect Effects on Winter Range

Alternative 1: This alternative would cause no direct or indirect effects to elk winter range. Approximately 120 acres or 4% of the elk winter range would remain less than 25 years old and would continue to decline in both quality and quantity, due to increased conifer cover and reduced shrub (browse) vigor. This percentage is below the desired 10 to 25% of the winter range needed to provide a sustained supply of quality browse forage on winter range (Talbert, 2010).

Alternatives 2 and 3: Both alternatives would slightly increase available winter browse habitat less than 25 years old to 100 to 120 acres or 7% of the elk winter range. Although below the desired 10 to 25% browse production across the winter range, this increase would help offset the decline of 120 acres of existing browse habitat, due to increased conifer cover and reduced shrub (browse) vigor.

C. Cumulative Effects on Summer and Winter Ranges

Geographic Boundary: The area for assessing cumulative effects on elk are the five EAUs, since the direct and indirect effects of the project would occur in this area. This also includes the 3,000 acres of winter range in the project area, where the aim is to achieve the desired condition of 10 to 25% of the winter range less than 25 years old (e.g., producing quality winter browse).

Time frame: The period for this analysis includes: (1) the short-term (five to seven years), during which the direct and indirect effects of the project would occur; and (2) the long-term (defined as 20 years), the amount of time required for stands that are regeneration harvested to develop dense hiding cover.

Past, Present, and Foreseeable Future Actions: Past management activities are listed in Appendix A and are the basis for the existing condition described in Chapter 3. There are no present actions within the analysis area, and the only foreseeable future action on National Forest land that may affect open road densities and elk security is the Orogrande OHV project, currently being analyzed with a decision expected later this spring.

Alternative 1: There would be no cumulative effects on elk summer range, because this alternative proposes no activities that could be added to the present and/or foreseeable future actions.

Alternatives 2 and 3: The proposed Orogrande OHV trail system would locally increase the number of routes open to motorized use and decrease elk security. Within the Lower Orogrande analysis area there would no changes in elk habitat effectiveness as a direct result of the Orogrande OHV trail system. The trail project would have immeasurable cumulative effects to elk summer habitat. The Lower Orogrande project would restrict motorized vehicles on approximately 14.5 miles of system road to improve elk security. In addition, another 16 miles of system road and 73 miles of non-system road would be decommissioned. The combination of these two projects should lead to a lower density of roads and trails open to motorized use, increased elk habitat effectiveness, and increased elk security.

Foreseeable Future Actions on adjacent Private and State Lands: Reasonably foreseeable future activities on private and State lands just west of the cumulative effects analysis area are shown in Appendix A and include several timber harvest operations scheduled in the next few years. Given that the primary use of the private and state lands is timber production, it is likely that operations similar to the proposed activities will continue into and through the cumulative effects period as the various stands reach harvestable size. The activities would presumably include road construction and reconstruction as well as timber harvest. The private and State lands include elk summer range, and likely a small amount of winter range along Orogrande Creek.

Except for riparian and similar buffers, it is reasonable to assume that most or all timber stands providing summer range hiding cover on State and private lands will be cut within a few years of reaching a harvestable size, and this activity would tend to increase the forage component of elk summer range habitat. Based on an examination of satellite photographs, elk summer forage habitat is already relatively abundant west of the Forest boundary, and timber harvest would create forage habitat in harvested stands for about 20 years until conifers grow to a size that will once again offer hiding cover.

Based on an examination of satellite photographs, the area of private and State lands also has a high density of roads and skid trails. In addition to the density of roads and other motorized routes, a large part of the analysis of Elk Habitat Effectiveness is the type and timing of use, but it is not possible from the satellite photos to discern this quality of use. As a result, and because in general the use of motorized vehicles is substantially less controlled on private/State lands than on NFS land, we conclude that the standard road density in the area west of the project area is high, and that little, if any, elk security habitat is present there. While some restrictions and barriers exist on motorized use on private and State land, it seems unlikely that enough of the existing or new roads would be deactivated from an elk security or standard road density standpoint to increase the effectiveness of summer elk habitat over the cumulative effects period. It is also possible that road density could increase with future harvest activities.

Taken together, the reasonably foreseeable future condition of the private and State lands would be relatively more favorable than the project area in regard to summer forage availability, but security habitat, standard road density, and cover would be somewhat less favorable. On the whole, the higher amount of forage on the private and State lands would tend to benefit summer elk production in the cumulative effects area if individual elk utilizing this forage are also able to benefit from cover and higher security on NFS land. Any activities on the small amount of elk winter range on private/State land likely would have no effect on elk viability cumulative effects.

Future activities on private/State land would likely affect elk production and survival in the vicinity of the Lower Orogrande project. However, given the small differences in elk habitat effectiveness among the project alternatives, any effects manifested in private/State management would not distinguish among the alternatives at the cumulative effects scale, resulting in no cumulative effects on elk viability.

Forest Plan and Regulatory Consistency: Forest Plan standards for elk habitat effectiveness (25% in each EAU) are currently being exceeded in the analysis area. Alternative 1 would not affect elk habitat effectiveness, which is currently above 25%. The action alternatives would each decrease elk habitat effectiveness, but remain above the Forest Plan standard of 25%.

All Alternatives comply with the resource specific goal (CNF Plan III-47, C.2, Wildlife and Fish) stated for Management Area C4 of the 1987 Clearwater Forest Plan to “maintain a minimum of 25% of the area in stands of trees of adequate size for thermal cover...” All Alternatives, however, are short of the general goal stated for Management Area C4 of the 1987 Clearwater Forest Plan (CNF Plan III-47, B) to “Manage big-game winter range to provide sufficient forage and cover for existing and projected big-game populations....”

2. Northern Goshawk

Methodology: The effects analysis has two parts. The first analysis consists of the Clearwater N.F.-developed nesting habitat model that uses stand age of ≥130 years as a surrogate for the presence of the large-diameter trees and snags necessary for nesting success. The Clearwater N.F. foraging habitat model uses crown closure of ≥40% and canopy layer breaks in all stands as a surrogate for suitability, such that many mid- and late seral stands in the project area qualify as foraging habitat. Further, essentially all nesting habitat under this model also qualifies as foraging habitat. In this analysis, existing habitat areas and changes associated with action alternatives are quantified.

The second analysis focuses on the potential number of goshawk territories in the project area. This analysis of effects on goshawks uses approach described in Reynolds et al. (1992) and Brewer et al. (2009) to assess potential effects. Assessment areas of 5,000 acres at a minimum (USDA 1990) and 5,400 acres not including nest areas, PFA, and natural or created openings (Reynolds et al. 1992) are recommended for evaluation of potential goshawk suitability. Three assessment areas were delineated within the ~21,000-acre project area based on topographic features and existing stand boundaries (refer to Figure 2 in the *Wildlife Specialist Report*) to represent three hypothetical goshawk home ranges. Within the Forest-managed project area, these assessment areas are somewhat larger than necessary by the acreage standards described above, but it was assumed that foraging habitat on non-Forest land to the west would be relatively scarce and so delineation of four home ranges so close to the Forest boundary was probably not warranted.

Management recommendations for each home range include approximately three suitable nest areas and three replacement areas (each 40 acres) per home range within a mosaic of vegetation structural stages and fitted into approximately 420-acre PFAs. In this analysis, the circular hypothetical nest and PFA areas were superimposed in a Geographical Information System (GIS) file onto each of the three home ranges using the Clearwater N.F. GIS model criteria for nesting and foraging habitat. Many of the suitable nest areas were not fitted with hypothetical PFAs in order to avoid overlap and proposed harvest units.

The second analysis also compares the recommended (Reynolds et al. 1992) proportions of vegetation types within goshawk home ranges with the existing condition and the conditions under the action alternatives.

a. Direct and Indirect Effects

The net effect of each alternative is shown in Tables 4.7 and 4.7a. Timber harvest in Alternatives 2 and 3 would reduce nesting habitat within the analysis area by less than one percent (either alternative), and both alternative would reduce foraging habitat by less than five percent. However, none of the alternatives are expected to cause any measurable change to goshawk survival or reproduction.

Alternative 1: Since this alternative proposes no management activities, there would be no direct effects to northern goshawk habitat. Suitable habitat to support three hypothetical goshawk home ranges would be unaffected.

Alternatives 2 and 3: Direct adverse effects to nesting goshawk adults and young would be avoided, because any active goshawk nests found during harvest activities would be protected by establishing a post fledging area (PFA) of 420 acres, where a no-activity buffer zone would be implemented from April 15 to August 15 (mitigation measure #15). Individual non-breeding goshawks outside of protected active nest/PFAs may be disturbed by project activities under the action alternatives, but individuals would move away from areas of active treatment and so would not be injured or killed. Sufficient habitats are available outside the treatment units to support the local goshawk population during project implementation (see discussion below).

Table 4.7 – Goshawk Recommended Condition and Predicted Condition for Alternatives

Habitat Recommended		**Existing (Alt. 1)**		**Proposed (Alt. 2)**		**Alternative 3**	
Area A (Total 7,314 acres)							
# Nest areas	6*	32**/16***		31**/16***		31**/16***	
	% of area	**Acres**	**%**	**Acres**	**%**	**Acres**	**%**
Grass/Shrub	10	11	<1	361	5	344	5
Seed/Sap	10	0	0	0	0	0	0
Pole	20	1870	26	1744	24	1744	24
Mid/Late	60	5289	72	4939	68	4956	68
Area B (Total 6,961 acres)							
# Nest areas	6*	30**/15***		30**/15***		30**/15***	
	% of area	**Acres**	**%**	**Acres**	**%**	**Acres**	**%**
Grass/Shrub	10	0	0	147	2	147	2
Seed/Sap	10	162	2	162	2	162	2
Pole	20	976	14	976	14	976	14
Mid/Late	60	5823	84	5676	82	5676	82

Area C (Total 7,383 acres)							
# Nest areas	6*	33***/19**		33***/19**		33***/19**	
	% of area	**Acres**	**%**	**Acres**	**%**	**Acres**	**%**
Grass/Shrub	10	0	0	69	1	59	1
Seed/Sap	10	319	4	319	4	319	4
Pole	20	1221	17	1221	17	1221	17
Mid/Late	60	5555	75	5486	74	5496	74

*Recommendation is for 3 suitable and 3 replacement nest areas (Reynolds et al. 1992) and 6 per home range (Brewer et al. 2009)
**Approximate number of defined hypothetical 40-acre nest areas
***Nest areas with defined hypothetical 240-acre PFAs

Table 4.7a – Modeled Habitat Availability and Short-term Changes for Northern Goshawk

	Habitat Available on the Clearwater National Forest (acres)	Habitat in the Lower Orogrande Analysis Area (acres)	Habitat in the Lower Orogrande Treatment Units (acres)	Change in Habitat Availability in the Analysis Area (acres)	Change in Habitat Availability within the Analysis Area (percent)
Existing Condition & Alt 1	Nesting: 31,801 Foraging: 575,596	Nesting: 5,745 Foraging: 8,752	Nesting: 0 Foraging: 0	Nesting: 0 Foraging: 0	Nesting: 0 Foraging: 0
Alt 2			Nesting: 50 Foraging: 785	Nesting: -50 Foraging: -431	Nesting: -0.9% Foraging: -4.9%
Alt 3			Nesting: 50 Foraging: 733	Nesting: -50 Foraging: -379	Nesting: -0.9% Foraging: -4.3%

Within each of the three hypothetical goshawk home ranges, each of the action alternatives would maintain sufficient and relatively well-distributed nesting, foraging, and PFA habitat (above Tables). As previously noted, timber harvest has been shown to reduce or eliminate goshawk nesting, PFA, or foraging habitat, depending on the extent of the harvest. Only the regeneration harvest treatments proposed (and associated fuels treatments, to some extent) are expected to substantially change habitat conditions for goshawks, because these treatments would eliminate nearly all modeled habitat from treated areas in both the short-term and long-term because most trees suitable for nesting (and most mature trees that could grow to suitable size in the near-term) would be removed. Commercial thinning and pre-commercial thinning would not affect modeled goshawk habitat, because the stand structure of the foraging and PFA habitats coincident with these units would remain similar, albeit less dense, to the existing condition.

Up to 481 acres of goshawk habitat (identified using the Clearwater N.F. models) would be regeneration harvested, including up to about 1% of modeled nesting habitat and up to about 5% of foraging habitat in the analysis area.

The 50 acres of nesting habitat proposed for harvest in Units 9, 28, and 29 should not affect the nesting success of goshawks in the project area. This is primarily because much more nesting habitat is present in each of the three hypothetical home ranges than is necessary for a goshawk pair to successfully reproduce. Goshawk breeding pairs often use multiple alternative nest sites within a home range, while each of the hypothetical home ranges in the project area includes at least twice as many nest areas as are recommended (Reynolds et al. 1992). Further, the harvest would occur entirely in relatively isolated stands, and the small and spatially separated harvest areas in nesting habitat would also be in the youngest (i.e., most marginal) category of stands modeled as suitable. Units 28 and 29 are in modeled nesting habitat areas that would not be large enough to constitute suitable nest areas with or without harvest. Proposed harvest in Unit 9 would occur in modeled nesting habitat that would be large enough to constitute a suitable nest area, but as noted above, this area is remote from the bulk of the nesting habitat in the home range, and many alternative potential nest areas would remain. Thus, there should be no measurable effect on reproductive success as a result of timber harvest.

As displayed above, both action alternatives would reduce foraging habitat to some extent. Again blending the two analysis methods, the harvest units would be scattered across the width of the project area, thus spreading the up to 431-acre reduction in modeled foraging habitat across all three theoretical home ranges. As such, there should not be a biological meaningful reduction in PFA or foraging success for any of the three hypothetical home ranges in the analysis area with either action alternative because the modeled foraging habitat harvested under the action alternatives would leave substantially more than the 60% of mid- and late-seral stands necessary (Reynolds et al. 1992) per home range. Thus, either action alternative should have little effect on goshawk abundance or persistence, because late seral (i.e. nesting) habitat would be little-affected, while mid-seral (i.e. foraging) habitat would continue to remain abundant outside of the harvest units. The proposed action would maintain sufficient nesting habitat well distributed throughout each goshawk analysis area with potential PFAs. Both action alternatives would maintain middle-aged to old forest habitat (i.e. those with the higher forage value) well in excess of the recommended 60% in each goshawk analysis area.

The construction of about 2.4 miles of temporary road to access harvest units in Alternative 2 would potentially eliminate nesting and foraging habitat along narrow corridors. However, in this project, these roads would be almost entirely in harvest units, and so vegetation treatment and tree cutting for road constructions would not be distinguishable. Temporary roads constructed would be decommissioned after use and allowed to revegetate. Changes to access management and road configurations would have little effect on goshawks, because few or no substantial trees would be removed in these activities.

b. Cumulative Effects

Geographic Boundary: The area for assessing cumulative effects on goshawks is the Lower Orogrande project area. As discussed above, this area is sufficient to support at least three home ranges and is the area where project effects would occur. Expanding the boundary further would dilute those effects.

Time frame: The time frame is approximately four decades. This is about the period necessary for a regeneration-harvested unit to regrow conifers to the smallest size class that would qualify as goshawk foraging habitat under the Clearwater N.F. GIS model.

Past, Present, and Foreseeable Future Actions: Past timber harvest has decreased the current availability of mature and old growth forest habitats that provide the highest quality potential habitats for this species in the Lower Orogrande project area and private lands to the west of the project area are likely to contribute little to goshawk nesting habitat in the vicinity of the project area. As a consequence, the long-term viability of this species in the vicinity of the project area is likely dependent upon Forest Service management.

There are no present NEPA-analyzed actions within the analysis area, and human activity is primarily dispersed recreation. The only foreseeable future action is the Orogrande OHV Trail project. However, the analysis of effects of approximately 3.1 miles of proposed OHV trail through goshawk habitat indicated no change in habitat availability or suitability (Schweich 2010). Thus, there would be no cumulative effects on goshawk habitat when added to the project.

Conclusion: Each of the action alternatives would contribute to the loss of suitable goshawk nesting and foraging habitats in the analysis area, but there would be no cumulative effects associated with this project or analysis area that would jeopardize populations of northern goshawks. This conclusion is based on: (1) the limited effects from this project; (2) documented goshawk activity relatively near the project area; (3) the stable and well-distributed population across the Region; and (4) adequate amounts of habitat in the project area and across the Clearwater N.F.

Forest Plan and Regulatory Consistency: All alternatives would retain well-distributed goshawk habitat. None of the standards or guidelines of the Clearwater Forest Plan specifically address goshawks or goshawk habitat beyond the species' designation as a Management Indicator and as a relevant species for the guidelines for old growth retention in Appendix H of the Forest Plan.

3. Pileated Woodpecker

Methodology: The analysis of effects on pileated woodpeckers is based on habitat associations and direction in USDA (1990) and Samson (2006a) and other scientific literature (primarily Bull and Jackson 1995). A Clearwater N.F. GIS-based habitat suitability model consistent with USDA (1990) and Samson (2006a) was used to identify potential suitable habitat. The Clearwater N.F. nesting habitat model uses stand age of ≥130 years as a surrogate for the presence of the large-diameter trees and snags necessary for nesting success. The foraging habitat model uses stand succession of mid-seral or older as a surrogate for suitability.

The second analysis methodology for determining potential effects on pileated woodpeckers involved mapping old growth and mature forest stands (i.e. suitable nesting habitat) in the wildlife analysis area and delineating circular hypothetical 1,000-acre home ranges based on the distribution of suitable nesting stands/groups of stands. For analysis purposes a total of 13 home ranges were delineated. Once home ranges with suitable nest stands were identified, the suitability of surrounding stands in the home range to provide adequate feeding habitat was evaluated. Based on relative habitat values and the acres of suitable nesting habitat a home range should have (USDA 1990) areas with at least 100 acres of contiguous mature and/or old growth forest habitat (i.e., modeled nesting habitat) and an additional contiguous 100 acres of immature/sawtimber or larger size tree habitat (i.e., modeled foraging or nesting habitat) were identified as having sufficient suitable habitat. Once home ranges with suitable nest stands were identified, the suitability of surrounding stands in the home range to provide adequate feeding habitat was evaluated. Within each home range at least 500 acres of sawtimber/mature sawtimber forest and/or immature sawtimber habitat is needed to provide adequate feeding habitat (USDA 1990). Potential impacts on suitable habitat were then determined for each home range. Hypothetical home ranges were delineated around all nesting habitat of suitable area in the project area; the home ranges were fitted to avoid overlap, maximize habitat area, and avoid treatment units.

a. Direct and Indirect Effects

The net effect of each alternative is shown in Tables 4.8 and 4.8a. Timber harvest in Alternatives 2 and 3 would reduce nesting habitat within the analysis area by less than one percent (either alternative), and reduce foraging habitat by 12.9% and 11.1%, respectively. However, none of the alternatives are expected to cause any measurable change to woodpecker survival or reproduction.

Alternative 1: This alternative would cause no direct effects to pileated woodpecker habitat. Suitable habitat to support 13 hypothetical pileated woodpecker home ranges would be unaffected.

Alternatives 2 and 3: Direct adverse effects to nesting pileated woodpeckers and young should be very unlikely because vegetation treatments would be implemented in only 0.3 acres (at the edge of Home Range J) out of a total of over 4,600 acres of modeled nesting habitat within the 13 hypothetical home ranges. Individual foraging woodpeckers may be disturbed by project activities under the action alternatives. However, this disturbance is not expected to affect their survival or reproduction but individuals would move away from areas of active treatment and would not be injured or killed. Sufficient habitats are available outside the treatment units to support the local pileated woodpecker population during project implementation (see discussion below).

Table 4.8 – Habitat Availability and Short-term Changes for Pileated Woodpecker

	Habitat Available on the Clearwater National Forest (acres)	Habitat in the Lower Orogrande Analysis Area (acres)	Habitat in the Lower Orogrande Treatment Units (acres)	Change in Habitat Availability in the Analysis Area (acres)	Change in Habitat Availability within the Analysis Area (percent)
Existing Condition & Alt 1	Nesting: 268,718 Foraging: 338,680	Nesting: 5,745 Foraging: 7,381	Nesting: 0 Foraging: 0	Nesting: 0 Foraging: 0	Nesting: 0 Foraging: 0
Alt 2			Nesting: 50 Foraging: 954	Nesting: -50 Foraging: -954	Nesting: -0.9% Foraging: -12.9%
Alt 3			Nesting: 50 Foraging: 821	Nesting: -50/-0.9 Foraging: -821	Nesting: -0.9% Foraging: -11.1%

Table 4.8a – Pileated Woodpecker Hypothetical Home Ranges, Existing, Recommended, and Predicted Conditions for Alternatives

Home Range	Existing (Alternative 1)		Total* (ac)	Proposed (Alternative 2)		Δ Alt 1 (ac)	Alternative 3		Δ Alt 1 (ac)
	Nesting (ac)	Foraging (ac)		Nesting (ac)	Foraging (ac)		Nesting (ac)	Foraging (ac)	
A	442	203	645	442	203	0	442	203	0
B	724	86	810	724	86	0	724	86	0
C	425	277	702	425	277	0	425	277	0
D	235	514	749	235	514	0	235	514	0
E	230	722	952	230	722	0	230	722	0
F**	255	393	648	255	325	0N, -68F	255	325	0N, -68F
G	440	297	737	440	297	0	440	297	0
H	403	299	702	403	238	0N, -61F	403	238	0N, -61F
I**	321	242	563	321	239	0N, -3.1F	321	239	0N, -3.1F
J**	240	279	519	240	277	-0.3N, -2F	240	277	-0.3N, -2F
K	425	160	585	425	160	0	425	160	0
L	309	314	623	309	314	0	309	314	0
M	194	307	501	194	307	0N, -0.1F	194	307	0

*Minimum amount is 500 acres
**Habitat from outside the project area necessary to provide sufficient suitable foraging habitat

Within each of the 13 hypothetical pileated woodpecker home ranges, each of the action alternatives would maintain sufficient and relatively well-distributed nesting and foraging habitat (above Tables). As previously noted, timber harvest has been shown to potentially reduce reproductive success of pileated woodpeckers (Bull et al. 2007), depending on the extent of the harvest. Regeneration harvest and commercial thinning (and associated fuels treatments, to some extent) in the action alternatives would eliminate most modeled habitat within treated areas in both the short-term and long-term, because many snags used for nesting and foraging (and mature trees that could become snags) would be removed. Pre-commercial thinning would not affect modeled pileated woodpecker habitat, since these areas do not currently provide trees or snags of sufficient size. Only the regeneration and commercial thinning harvest treatments are expected to substantially change habitat conditions for pileated woodpeckers.

The harvest of 50 acres of modeled nesting habitat in Units 9, 28, and 29 should not affect the nesting success of pileated woodpeckers in the project area. This is primarily because much more nesting habitat is present in each of the thirteen hypothetical home ranges than is necessary to be considered a suitable nesting area (a contiguous 100 acres, (USDA 1990)), with or without the proposed action. Further, the 50 acres of modeled nesting habitat in Units 9, 28, and 29 would not be in large enough portions to constitute suitable nest areas with or without harvest. Thus, there should be no measurable effect on reproductive success, as a result of timber harvest.

As displayed above, both action alternatives would reduce modeled foraging habitat in the project area by up to about 13%. As shown in Table 4.7a, however, all 13 of the hypothetical home ranges would retain adequate (i.e., ≥500 acres (USDA 1990)) or better acreage of combined foraging/nesting habitat with either action alternative. In addition to habitat within the home ranges, the project area would retain an additional 2,346 acres of combined modeled foraging/nesting habitat outside of the 13 home ranges, much of which would be accessible to pileated woodpeckers depending on the distance from actual nest and roost trees (Samson 2006a). In summary, neither action alternative should have any effect on woodpecker abundance or persistence in the project area, because late seral (i.e. nesting) habitat would be little-affected, while mid-seral (i.e. foraging) habitat would continue to remain abundant outside of the harvest units while stands harvested in the late 20th century would continue to recruit into foraging habitat.

Construction of about 2.4 miles of temporary road accessing harvest units in Alternative 2 would typically have little to no effect on pileated woodpecker habitat. This is due to most of the road being constructed either in previous or proposed harvest units, and so few (if any) trees used for nesting and foraging would be removed specifically because of the road. Changes to access management and changes in existing road configurations would have little effect on pileated woodpeckers, because few or no substantial trees would be removed in these activities.

b. Cumulative Effects

Geographic Boundary: The area for assessing cumulative effects on pileated woodpeckers is the Lower Orogrande project area. This is because the project area is large enough to include all of the direct and indirect effects of this proposal, includes 13 hypothetical home ranges, and going larger would dilute the contribution of project effects.

Time frame: The time frame is approximately four decades. This is about the period necessary for a regeneration-harvested unit to regrow conifers to the smallest size class that would qualify as pileated woodpecker foraging habitat under the Clearwater N.F. GIS model.

Past, Present, and Foreseeable Future Actions: Past timber harvest has decreased the current availability of mature and old growth forest habitats that provide the highest quality potential habitats for this species in the Lower Orogrande project area, and private lands to the west of the project area are likely to contribute little to woodpecker nesting habitat in the vicinity of the project area. As a consequence, the long-term viability of this species in the vicinity of the project area is likely dependent upon Forest Service management.

There are no present NEPA-analyzed actions within the analysis area, and human activity is primarily dispersed recreation. The only foreseeable future action is the Orogrande OHV Trail project. However, the analysis of effects of approximately 3.1 miles of proposed OHV trail through pileated woodpecker habitat indicated no change in habitat availability or suitability (Schweich 2010). Thus, there would be no cumulative effects on pileated woodpecker habitat when added to the project.

Conclusion: Each of the action alternatives would contribute to the loss of suitable pileated woodpecker nesting and foraging habitats in the analysis area, but there would be no cumulative effects associated with this project or analysis area that would jeopardize populations of pileated woodpeckers. This conclusion is based on: (1) the limited effects from this project; (2) the maintenance of existing suitable habitat and home ranges in the full analysis area; (3) the retention of existing mid-seral stands that would succeed to suitable habitat: (4) compliance with the Forest Plan standards for old growth (to provide for viable populations of old-growth dependent and MIS); (5) the abundance and distribution of nest site habitat and winter forage habitat across Region 1 and the Clearwater N.F.; and (6) the apparent trend of increasing pileated woodpecker populations.

Forest Plan and Regulatory Consistency: All alternatives would retain well-distributed pileated woodpecker habitat. The old growth habitat standards in Appendix H of the Clearwater National Forest Plan relevant to pileated woodpeckers [i.e. that 300 acres of old growth stands of adequate dimensions and distribution be maintained in each Old Growth Analysis Unit (OGAU)] would be followed to the extent that existing conditions allow. Of the two OGAUs that exist primarily within the project area, OGAU 112 would maintain such stands (and these stands would be greatly expanded as mature stands recruit into old growth within the next 20 years), but OGAU 111 does not currently support such a patch of stands (because of existing stand width and distribution). Similar to OGAU 112, mature stands in OGAU 111 should develop several of the old growth stand patches within 20 years, and the proposal should not retard this development.

4. Pine Marten

Methodology: Using the analysis area as the geographic scope for direct and indirect effects, a GIS habitat analysis was applied based on the vegetation analysis for the project. The Clearwater N.F. marten habitat model credits all mid- and late-seral stands with at least a portion of the stands ≥4,000 feet in elevation, with a live tree stem density of ≥40 per acre as suitable habitat.

a. Direct and Indirect Effects

The net effect of each alternative is shown in Table 4.9. Timber harvest in Alternatives 2 and 3 would reduce marten habitat within the analysis area by less than seven percent and six percent, respectively. Commercial thinning and pre-commercial thinning would not affect modeled marten habitat, because the stand structure of the habitat coincident with these units would remain similar, albeit less dense, to the existing condition. Because of location and arrangement of the regeneration harvest units, however, none of the alternatives are expected to cause any measurable change to pine marten survival or reproduction.

Table 4.9 – Habitat Availability and Short-term Changes for Pine Marten

	Habitat Available on the Clearwater National Forest (acres)	Habitat in the Lower Orogrande Analysis Area (acres)	Habitat in the Lower Orogrande Treatment Units (acres)	Change in Habitat Availability in the Analysis Area (acres)	Change in Habitat Availability within the Analysis Area (percent)
Existing Condition & Alt 1	903,146	6,363	0	0	0
Alt 2			623	-433	-6.8%
Alt 3			561	-371	-5.8%

Alternative 1: This alternative would cause no direct effects to pine marten habitat. Alternative 1 proposes no management activities that would affect the ability of pine martens to occupy the analysis area now or in the future, nor would it affect the availability of habitat at the Forest level.

Alternatives 2 and 3: As shown above, up to 7% of the 6,363 acres of modeled marten habitat in the project area would be affected under the action alternatives, which, mathematically, constitutes a small proportion of any one male's territory. The home range of a male martens is on the order of 6,000-7,000 contiguous acres (Bull and Heater 2001), however, while the modeled marten habitat in the project area is essentially split between the higher-altitude portions of the project area, leaving a 2.5 to 5-mile gap between the northern and southern areas of contiguous suitable habitat. The modeled contiguous marten habitat north of the proposed northern harvest units (1-18) is part an approximately 10,000-acre area of the CNF that extends north to the 4,000-foot contour line on the south end of the Washington Creek drainage. The modeled marten habitat on the south side of the project area is contiguous or nearly so with >100,000 acres of CNF-managed land >4,000 in elevation between the North Fork Clearwater and Lochsa rivers, most of which is contiguous marten habitat. As a result, it seems likely that any marten home ranges in the project area would be associated with either the northern or southern marten habitat areas, rather than the boundaries of the project area.

In the project area, nearly all of the proposed harvest units included in modeled marten habitat straddle (or are contiguous with or downslope of such units) of the 4,000-foot elevation contour line, and so should be considered marginal marten habitat. The remaining ~68 acres of modeled marten habitat in Units 27, 28, and 29 would occur in units that are on or contiguous with the ~5,000-foot elevation ridge at the southern edge of the project. As such, the proposed regeneration harvest would maintain the central and contiguous cores of marten habitat (and the constituent home ranges) to the north and south of the project area while retaining substantial marginal habitat in the project area. The reduction in habitat associated with Units 27, 28, and 29 would constitute only about1% of the amount recommended (Bull and Heater 2001) to maintain the viability of a marten pair, so any home range associated with the units should retain suitable habitat to remain well within the extent of variability for marten (Buskirk and McDonald 1989, Bull and Heater 2001).

Changes in access management would likely have the largest (beneficial) effect on marten habitats. The combination of road decommissioning, storage, and access changes to roads, common to each action alternative, would generally maintain open road density at a relatively low level, substantially increasing summer security areas and habitat effectiveness and potentially reducing vulnerability to winter trapping.

In summary, individual martens may be disturbed by project activities under each action alternative, but this disturbance is not expected to affect their survival or reproduction, since individuals would likely move away from areas of active treatment and not be injured or killed. Also, sufficient habitats are available outside the treatment units to support the local marten population during and following project implementation.

b. Cumulative Effects

Geographic Boundary: The area for assessing cumulative effects on pine martens is the Lower Orogrande project area. As discussed above, this area is marginal in and of itself to support any marten home ranges but is the area where project effects would occur. Expanding the boundary further would, in this case, unreasonably suggest that project effects would be biologically significant in the substantial areas of suitable marten habitat to the north and south of project vegetation treatments.

Time frame: The time frame is approximately four decades. This is about the period necessary for a regeneration-harvested unit to regrow conifers to the smallest size class that would qualify as pine marten habitat under the Clearwater N.F. GIS model.

Past, Present, and Foreseeable Future Actions: Past timber harvest has decreased the current availability of mature and old growth forest habitats that provide the highest quality potential habitats for this species in the Lower Orogrande project area. Some mortality to individual martens in the project area may continue to be caused by trapping, but the project area is marginal habitat for the species (i.e., it may be avoided by competent trappers) so the magnitude of this impact may be small. There are no present NEPA-analyzed actions within the analysis area, and human activity is primarily dispersed recreation. The only foreseeable future action is the Orogrande OHV Trail project. However, the analysis of effects of approximately 3.1 miles of proposed OHV trail through marten habitat indicated no change in habitat availability or suitability (Schweich 2010). Thus, there would be no cumulative effects on marten habitat when added to the project.

Conclusion: No measurable effects to marten populations at the Forest or regional scale, or alteration of current population trend, are expected from the cumulative effects of any of the alternatives. This is based on the widespread availability of suitable habitats across the Forest and region, and the fact that nearly all of the units proposed for harvest would be unsuitable or marginal habitat from an elevation perspective.

Forest Plan and Regulatory Consistency: All alternatives would retain well-distributed pine marten habitat. None of the standards or guidelines of the Clearwater Forest Plan specifically address martens or marten habitat (beyond the species' designation as a Management Indicator).

C. Sensitive Species

1. Fisher

Only suitable fisher winter habitat would be affected by proposed activities. Regeneration harvest would reduce cover for both fisher denning and foraging, whereas, commercial thinning would have no effect.

a. Direct and Indirect Effects

Alternatives 1 and 3: These alternatives would cause no direct or indirect effects to fisher winter or summer habitats. Approximately 2,550 acres of winter habitat and 130 acres of summer habitat would be retained within the analysis area. These habitats plus those known to be plentiful across the Forest would maintain a viable population of fisher.

Alternative 2: This alternative would regeneration harvest about 10 acres of winter habitat in Unit 6. This unit is isolated from other modeled fisher habitat, which, in the project area, is concentrated toward north and south. Given the persistence of this fishers in the relatively-heavily managed area surrounding the proposed project, and the generally large size and vegetatively diverse nature of fisher home ranges, there does not appear to be any reason to suspect that conversion of about 0.4% of modeled habitat in the project area to an early succession stage would have a biologically significant effect on fisher persistence at the project scale. The effect on winter habitat across the Forest would so small as to be immeasurable.

b. Cumulative Effects

Geographic Boundary: The area for assessing cumulative effects on fisher is the Lower Orogrande analysis area. This area is sufficiently large to support one or more fisher home ranges and is the area where project effects would occur.

Time frame: The time frame is approximately four decades. This is the when middle-aged conifer stands would reach maturity and be capable of providing large, down wood as potential denning sites.

Past, Present, and Foreseeable Future Actions: Past management activities are listed in Appendix A and are the basis for the existing condition. There are no present actions within the analysis area. The only foreseeable future action on National Forest land is the Orogrande OHV Trail project. However, the analysis of effects of approximately 3.1 miles of proposed OHV trail through fisher habitat indicated no change in habitat availability or suitability. Some mortality to individual fishers in the project area may continue to be caused by trapping, but fishers cannot be legally targeted in Idaho, so the magnitude of this impact should be small to nonexistent. Thus, there would be no cumulative effects on fisher habitat when added to this project.

Foreseeable Future Actions on adjacent Private and State Lands: Reasonably foreseeable future activities on private and State lands just west of the cumulative effects analysis area are shown in Appendix A and include several timber harvest operations scheduled in the next few years. As noted above under elk, similar levels of harvest should occur into and through the cumulative effects period. Since the CNF GIS model for fisher is largely dependent upon the presence of late seral and large mid-seral timber stands, it can be assumed that little habitat for this species will persist or develop in the long-term in the private/State lands directly west of the project area. As a consequence, the long-term viability of this species in the vicinity of the project area is likely dependent upon Forest Service management. Because the action alternatives should have minimal effects on fisher, the cumulative effects on this species should remain immeasurable.

Forest Plan and Regulatory Consistency: All alternatives would retain well distributed fisher habitat because of the minimal effects at both the project and Forest (10 acres treated of >1,000,000 acres) scales. The combination of standing live and dead trees per the Northern Region Snag Management Protocol (January 2000) and retention of old growth stands are expected to continue to provide suitable fisher habitat, well distributed throughout the Lower Orogrande analysis area.

2. Flammulated Owl

Of the 350 acres of potential flammulated owl habitat within the analysis area, the exclusion of fire has allowed the growth of Douglas-fir and grand fir to congest the forest floor and reduce suitability for flammulated owl habitation. Flammulated owl nesting and foraging habitat conditions could be improved by managing large (≥18” dbh) ponderosa pine and Douglas-fir density to between 10 and 20 trees per acre and by restoring or maintaining an open forest understory.

a. Direct and Indirect Effects

Alternatives 1 and 3: Neither alternative would result in vegetation treatments that would potentially result in habitat improvement for flammulated owl. Tree growth in the understory is expected to increase tree density, causing the suitability for habitation by flammulated owls to decline with time. An estimated 350 acres of modeled potential habitat would be retained in the project area.

Alternative 2: The 350 acres of modeled flammulated owl habitat in the project area would be affected by this alternative only through the proposed regeneration harvest of 34 acres in Unit 21, but this harvest is expected to retain 10+ larger trees per acre and open both the forest overstory and understory. To the extent that the project area is capable of producing actual flammulated owl habitat, the treatment would potentially improve flammulated owl nesting and foraging habitat conditions on the 34 acres treated.

b. Cumulative Effects

Geographic Boundary: The area for assessing cumulative effects on flammulated owls is the Lower Orogrande analysis area because this is the area where project effects would occur. Expanding the boundary further would, in this case, dilute those effects.

Time frame: The time frame is approximately two to four decades, the time it would take for ponderosa pine and Douglas fir to attain an ≥18” diameter.

Past, Present, and Foreseeable Future Actions: Past management activities are listed in Appendix A and are the basis for the existing condition. There are no present actions within the analysis area. The only foreseeable future action on National Forest land is the Orogrande OHV Trail project.

However, the analysis of effects of approximately 0.7 mile of proposed OHV trail through flammulated habitat indicated no change in habitat availability or suitability. Thus, there would be no cumulative effects on flammulated owl habitat when added to this project.

Foreseeable Future Actions on adjacent Private and State Lands: Reasonably foreseeable future activities on private and State lands just west of the cumulative effects analysis area are shown in Appendix A and include several timber harvest operations scheduled in the next few years. As noted above under elk, similar levels of harvest should occur into and through the cumulative effects period. The habitat requirements captured in CNF GIS models for this species, although not completely dependent upon the presence of late seral and large mid-seral timber stands, is weighted toward stands with some component of relatively large trees. Thus, it can be assumed that little habitat for this species will persist or develop in the long-term in the private/State lands directly west of the project area. As a consequence, if the project area has any potential for long-term flammulated owl persistence (which is doubtful considering the species' habitat preferences), the long-term viability of this species in the vicinity of the project area is likely dependent upon Forest Service management. Because the action alternatives should have minimal, and likely positive, the cumulative effects on this species should remain immeasurable.

Forest Plan and Regulatory Consistency: Planned actions comply with Forest Service policies and management actions to maintain available, well distributed flammulated owl habitat within the analysis area because of the minimal effects at both the project and Forest (34 acres treated of >15,900 acres) scales. The combination of standing live and dead trees per the Northern Region Snag Management Protocol (January 2000)}, in timber harvest units is expected to contribute to retention of any existing suitable flammulated owl habitat within the analysis area.

3. Western (Boreal) Toad

Up to 130 acres of modeled toad habitat could be affected by the planned actions. As described in Chapter 3, western toads can range widely in the abundant upland areas of the project area, but breeding habitat is relatively scarce and primarily confined to streams and adjacent riparian areas. Commercial and pre-commercial thinning in upland areas would retain large, down wood and cover and would not be expected to directly or indirectly effect reproduction or rearing habitats. Small tree thinning in riparian buffers would increase down wood and cover, but would not affect stream channels. Regeneration harvest in upland areas, followed by prescribed fire, would reduce large, down wood and cover, and road decommissioning could locally reduce mud-bottomed, shallow pools that are suitable for western toad reproduction. Road decommissioning activities would also locally disturb low stream gradient habitats.

a. Direct and Indirect Effects

Alternative 1: This alternative would cause no direct or indirect effects to western toad adults, eggs, or habitat. An estimated 7,000 acres of western toad habitat would be retained within the analysis area.

Alternatives 2 and 3: These alternatives would affect 130 acres and 110 acres of western toad habitat, respectively. The acres of regeneration harvest proposed by each alternative accounts for the difference in affected area. All of the core breeding habitat associated with streams would be protected from harvest treatments with default RHCA buffers. Because all of the harvest in modeled toad habitat would occur from 150 to 300 feet from non-fishbearing streams (i.e., outside of default RHCAs for these streams) there should be little difference between this habitat and that of much of the rest of the project area. Both alternatives include 45 acres of proposed road decommissioning, where some toad breeding habitat may exist in the form of puddles, but also where stream channels and riparian areas will be restored. Each alternative would essentially leave 98% of modeled western toad habitat unaffected by proposed activities, including all core stream habitats. Thus, the proposed project should not affect the persistence of western toads in the project area.

b. Cumulative Effects

Geographic Boundary: The area for assessing cumulative effects on western toad is the Lower Orogrande analysis area. This area provides sufficient area to address larger scale impacts on western toad habitat availability.

Time frame: The time frame is approximately one decade. This is the estimated time for dense shrub and young conifer cover to reestablish following road decommissioning.

Past, Present, and Foreseeable Future Actions: Past management activities are listed in Appendix A and are the basis for the existing condition. There are no present actions within the analysis area. The only foreseeable future action on National Forest land is the Orogrande OHV Trail project. However, the analysis of effects of approximately 1.7 miles of proposed OHV trail through western toad habitat indicated no change in habitat availability. Thus, there would be no cumulative effects on western toad habitat when added to this project.

Foreseeable Future Actions on adjacent Private and State Lands: Reasonably foreseeable future activities on private and State lands just west of the cumulative effects analysis area are shown in Appendix A and include several timber harvest operations scheduled in the next few years. As noted above under elk, similar levels of harvest should occur into and through the cumulative effects period. Toads are primarily dependent upon streams and wetlands. Because State regulations on timber harvest (Idaho Administrative Procedures Act 20.02.01) require that limited-entry buffers be maintained on both fishbearing and non-fishbearing streams and that disturbances to wetlands be avoided, there should be limited opportunity for State/private activities to adversely affect primary toad habitat. Buffers and other Best Management Practices should also reduce the likelihood of effects to toad prey. Thus, there should be no State/private effects manifested in the cumulative effects analysis area for any of the alternatives.

Forest Plan and Regulatory Consistency: No specific Forest Plan standards, guidelines, or other regulations apply to the western toad; however, the INFISH buffers that would protect the highest quality toad habitats have been incorporated by amendment into the Forest Plan. Each of the action alternatives would implement these buffers as required by the Forest Plan.

4. Wolverine

Up to 33 acres of modeled potential wolverine foraging habitat would be affected by regeneration harvest, followed by prescribed fire, which would reduce large, down wood and cover. The harvest would not affect the modeled suitability of the treated areas, however, because wolverines are adapted to foraging in a variety of vegetation conditions.

a. Direct and Indirect Effects

Alternative 1: This alternative would cause no direct or indirect effects to wolverine habitat. An estimated 600 acres of potential wolverine foraging habitat would be retained within the analysis area.

Alternatives 2 and 3: Regeneration Units 27, 28, and 29 would affect 28 acres of wolverine habitat under Alternative 2 and 24 acres under Alternative 3. This would leave 95 to 96% of potential foraging habitat unaffected by proposed activities, but the 4-5% treated would remain as suitable habitat. Improvement in cervid browsing habitat would potentially improve habitat for elk and other cervids on which foraging wolverine might prey, but any benefits to wolverines would be speculative.

b. Cumulative Effects

Geographic Boundary: The area for assessing cumulative effects on wolverine is the Lower Orogrande analysis area. Although the project area is much smaller than the home range of an individual animal, and much of the area is of a lower elevation than typically used by wolverines, the project effects would be close to neutral, so expanding the boundary further would (though biologically consistent) dilute those effects. This area provides sufficient area to address impacts on wolverine habitat.

Time frame: The time frame is approximately four decades. This is the when middle-aged conifer stands would reach maturity and be capable of providing large, down wood as potential denning sites.

Past, Present, and Foreseeable Future Actions: Past management activities are listed in Appendix A and are the basis for the existing condition. There are no present actions within the analysis area. The only foreseeable future action on National Forest land is the Orogrande OHV Trail project, which would have no effects on wolverine habitat. Thus, there would be no cumulative effects on wolverine habitat when added to this project.

Foreseeable Future Actions on adjacent Private and State Lands: Reasonably foreseeable future activities on private and State lands just west of the cumulative effects analysis area are shown in Appendix A and include several timber harvest operations scheduled in the next few years. As noted above under elk, similar levels of harvest should occur into and through the cumulative effects period. Since the CNF GIS model for wolverine foraging habitat is largely-dependent upon altitude, it can be assumed that little habitat for this species will persist or develop in the long-term on private/State lands directly west of the project area, which are generally lower in elevation than the project area. As a consequence, the long-term viability of this species in the vicinity of the project area is likely dependent upon Forest Service management, especially in denning habitat outside of the project area. Because the action alternatives should have a minimal effect on wolverine, the cumulative effects on this species should remain immeasurable.

Forest Plan and Regulatory Consistency: Planned actions comply with Forest Service policies and management actions to maintain available, well distributed wolverine habitat within the analysis area because, as described above, the effects of the proposed actions should be close to neutral.

V. Vegetation (Ref: Lower Orogrande Vegetation Report)

The purpose of the proposed vegetative treatments is to start the trend to: (1) restore white pine and larch; (2) improve species diversity (i.e. alter species composition from grand fir and Douglas-fir to western white pine and other seral species); and (3) balance vegetative successional stages across the landscape (i.e. focus on 40-100 year old stands that are overstocked and responsible for poor health and low growth vigor). Only Alternatives 2 and 3 meet the purpose in varying degrees. The effects of all alternatives being considered are discussed below, including their effects on landscape pattern, climate change, and sensitive plants.

A. Forest Cover Types

1. Direct and Indirect Effects

Alternative 1: Occurrence of early seral species such as western larch and western white pine would continue to decline under this alternative. Western white pine populations have declined enough that it is unlikely that this species would return to its past prevalence without intervention (Fins et al, 2001). Under the no action alternative, canopy gaps of sufficient size and openness are not expected to create conditions to allow western white pine to outcompete grand fir and other shade tolerant competitors (Jain et al, 2004).

Without disturbance, western larch is not expected to regenerate naturally, because western larch is dependent upon having mineral soil or a burned seedbed to reproduce successfully (Fiedler and Lloyd, 1995).

Alternatives 2 and 3: Amounts of western white pine and western larch would increase under either of these alternatives. Alternative 2 would convert approximately 350 acres (1.6% of the project area) to western larch and western white pine. Alternative 3 would convert about 110 acres (<1% of the project area) to western white pine and larch. Species conversion to western white pine and western larch would be primarily focused in the low relief hill, colluvial midslope, and breakland LTA groups as recommended by the BHROWS Assessment.

2. Cumulative Effects

Geographic Area: The cumulative effects area is the Lower Orogrande analysis area, which represents the smallest continuous area containing all of the proposed for vegetative treatments. While large enough to give a landscape view of the effects, the area is not too large that changes become diluted or not measurable.

Time frame: Five years after project implementation. This is the time it takes for harvested units to become successfully restocked with preferred species.

Past, Present, and Foreseeable Future Actions: The past actions that have most significantly affected forest cover types in the Lower Orogrande Project area are the introduction of white pine blister rust and past harvest activities, which are the basis for the existing condition (refer to the Vegetation section in Chapter 3). No present or reasonably foreseeable future actions beyond those in the current project that would affect forest cover types. Thus, there are no cumulative effects.

B. Insects and Disease

1. Direct and Indirect Effects

Alternative 1: Continued insect and disease activity is expected to cause mortality under this alternative. Stands composed primarily of grand fir and Douglas-fir would continue to experience root disease-caused mortality. These stands would also experience mortality caused by synergism of root disease and bark beetle attacks (Hagle, 2006).

With no action, amounts of white pine and western larch would not move towards historic levels. This would affect forest insects and diseases, because "without white pine, succession from early seral to late seral and climax dominated stands is often accelerated by 50 to 150 years…If this historically unprecedented shift in forest landscape composition is not reversed, future forests will be highly stressed and at risk of new insect and disease epidemics" (Zack, 1996).

Alternatives 2 and 3: The impacts of root disease would be lessened under either of these alternatives. Tree species with greater resistance to insect and disease attack would be planted in units proposed for regeneration harvest. White pine that has been bred selectively for blister rust resistance and western larch would be planted in the regeneration units. Mutation of blister rust to overcome resistance mechanisms is not a concern at this time because the white pine improvement program breeds for resistance rather than immunity (Fins et al, 2001). In units proposed for commercial thinning, precommercial thinning, or biomass removal, insect and disease-caused mortality would be expected to decrease due to increased tree vigor.

2. Cumulative Effects

Geographic Area: The cumulative effects area is the Lower Orogrande analysis area, which represents the smallest continuous area containing all of the proposed for vegetative treatments. While large enough to give a landscape view of the effects, the area is not too large that changes become diluted or not measurable.

Time frame: Five years after project implementation. This is the time it takes for harvested units to become successfully restocked with preferred species that are resistant to insects and disease.

Past, Present, and Foreseeable Future Actions: The past actions that have most significantly affected insects and disease in the Lower Orogrande Project area are the introduction of white pine blister rust and past harvest activities, which are the basis for the existing condition (refer to the Vegetation section in Chapter 3). No present or reasonably foreseeable future actions beyond those in the current project that would affect insects and disease. Thus, there are no cumulative effects.

C. Successional Stages

1. Direct and Indirect Effects

Alternative 1: The distribution of successional stages would not change under this alternative. Because regeneration harvest would not occur, the early seral stage would continue to be under-represented relative to historical conditions.

Alternatives 2 and 3: Regeneration harvest and prescribed burning, prescribed under each alternative, would cause early seral stages to increase. This increase would be in accordance with the direction to trend toward more historical conditions on the landscape. Alternatives 2 and 3 would return approximately 350 and 110 acres, respectively, to the early seral successional stage through regeneration harvest and prescribed burning.

2. Cumulative Effects

Geographic Area: The cumulative effects area is the Lower Orogrande analysis area, which represents the smallest continuous area containing all of the proposed for vegetative treatments. While large enough to give a landscape view of the effects, the area is not too large that changes become diluted or not measurable.

Time frame: Approximately four decades represents the time for young forest stands created by regeneration harvests to mature into the next successional stage.

Past, Present, and Foreseeable Future Actions: The past actions that have most significantly affected successional stages and are the basis of the existing condition are the introduction of white pine blister rust and past harvest activities that were concentrated over a relatively short time frame (30 years) but covered a large portion of the analysis area. No present or reasonably foreseeable future actions beyond those in the current project that would affect insects and disease. Thus, there are no cumulative effects.

D. Landscape Pattern

Literature shows that to best meet the objectives of creating resilient stand conditions and allowing for rapid recovery after disturbances, historic disturbance patterns on the landscape should be emulated and these patterns include patches that are generally over 40 acres in size. Each action alternative proposes regeneration harvest units that would contribute to creating openings greater than 40 acres. An alternative that would not exceed 40 acres was dismissed from detailed study, because treating smaller patches would not emulate historical patterns on the landscape and therefore would not achieve all the vegetation objectives for this project.

1. Direct and Indirect Effects

Alternative 1: Under this alternative, landscape patterns would not change, but over time the landscape would become more homogeneous. This increasing homogeneity increases susceptibility to disturbance that could create patch sizes larger than those found historically. Project objectives of creating stand conditions that are resilient and allow for rapid recovery after disturbances would not be achieved. Without action the following trends by LTA would likely continue:

<u>Colluvial Midslopes:</u>

- Numerous small patches smaller than historic size would persist in this LTA until the previously harvested stands reach maturity.
- There would be no trend toward historic landscape disturbance patterns.

<u>Non-Umbric Low Relief Rolling Hills:</u>

- This LTA would retain its relatively homogeneous state.
- The continued dominance by trees highly susceptible to root disease would likely continue to create small gaps in the canopy (¼ acre in size or smaller) over the coming years.
- The potential would exist for a disturbance to occur at a scale larger than historical size, because species composition and successional stage are not as diverse as they were historically.

<u>High Energy Deep Soil Breaklands:</u>

- This LTA would progress toward a more homogeneous pattern.
- The potential would exist for a disturbance to occur at a scale larger than historical size, due to lack of diversity in species composition and successional stage.

<u>Low Energy Breaklands:</u>

- This LTA would continue to contain numerous patches smaller than historical patch size.
- There would be no trend toward historic landscape disturbance patterns.

Alternatives 2 and 3: Landscape pattern would trend toward historical landscape patterns under each of these alternatives. A total of 480 acres of openings under Alternative 2 and 445 acres under Alternative 3 would be added to the landscape and start the trend towards historical patterns, as follows:

Colluvial Midslopes:

- Units 15 and 16 (a combined size of 128 acres under Alternative 2 and 93 acres under Alternative 3) would trend this LTA toward a more historical pattern.
- Unit 19 would connect existing units and create a patch of more than 100 acres.

Colluvial Midslopes/High Energy Deep Soil Breaklands/Low Energy Breaklands:

- Units 20 and 21 (a combined size of 89 acres) would trend all three of these LTAs toward historical landscape pattern.

Non-Umbric Low Relief Rolling Hills:

- Units 1, 2, and 10 (a combined size of 214 acres) would trend this LTA toward historical patterns.
- These units would add diversity to the landscape.

2. Cumulative Effects

Geographic Area: The cumulative effects area is the Lower Orogrande analysis area, which represents the smallest continuous area containing all of the proposed for vegetative treatments. While large enough to give a landscape view of the effects, the area is not too large that changes become diluted or not measurable.

Time frame: Approximately four decades represents the time for openings created by regeneration harvests to mature into the next successional stage, affecting overall landscape patterns.

Past, Present, and Foreseeable Future Actions: The past actions that have most significantly affected landscape patterns in the Lower Orogrande Project area are past harvest activities and fire suppression, which are the basis for the existing condition (refer to the Vegetation section in Chapter 3). There are no present or reasonably foreseeable future actions beyond those in the current project that would affect landscape pattern. Thus, there are no cumulative effects.

E. Climate Change

The effects of climate change were analyzed in two ways: (1) the effect climate change is expected to exert upon vegetation; and (2) the effect the alternatives is expected to have on climate change. The effects on vegetation are impossible to reliably predict, because the body of scientific literature regarding this topic currently consists of unproven hypotheses. Therefore, ecosystem resilience was used to analyze the effects of climate change on vegetation. Carbon storage and sequestering ability was used to analyze the effects of the alternatives on climate change.

1. Direct and Indirect Effects

Alternative 1: Increasing resilience is one of the keys to minimizing the effects of climate change to vegetation (USDA, 2008). Without action to increase the resilience of the forest to change, the effects of climate change are expected to be greater to vegetation under this alternative compared with the action alternatives.

Not taking action to improve ecological health could result in substantially lower carbon stocks and substantially increased carbon emissions in the future as the result of losses to insects and disease and possible severe wildfire. However, in the short term, this alternative would be expected to maintain carbon sequestering ability and carbon stocks.

Alternatives 2 and 3: The proposed treatments aimed at increasing the diversity of forest cover types and the distribution of successional stages should increase forest resilience. Alternative 2 and Alternative 3 would achieve this by regenerating 690 acres and 630 acres, respectively. The commercial thinning and precommercial thinning proposed under each alternative would also have some effect on species composition by leaving trees on the landscape that are less susceptible to insects and disease.

In the short term, each alternative would increase carbon dioxide outputs with prescribed burning activities. Carbon sequestering ability would also decrease by harvesting mature trees that have more sequestering ability than the seedlings that would replace them. However, this effect would reverse, as the seedlings become established and begin growing vigorously. The long term effects of this action would be to improve sequestering ability of the forest as disease prone trees are replaced with healthy, long-lived seral species.

Proposed commercial thinning would also remove trees that are currently sequestering carbon. This action would result in a short term reduction of carbon sequestering ability because of fewer trees left within the treated areas. Whereas, the long term effect of thinning the stands would be to improve the overall carbon sequestering ability of the treated areas by reducing competition, increasing tree vigor and growth, and decreasing tree mortality.

2. Cumulative Effects

A cumulative effects analysis for climate change was not conducted, since the Federal Government's Council on Environmental Quality is in the process of developing guidance on how to evaluate cumulative effects of climate change from land resource management activities.

F. Sensitive Plants (Ref: Rare Plant Report)

This section considers the disturbance due to proposed activities within suitable habitats for sensitive plants.

Methodology

Pre-field work included study of aerial photos and topographic and forest habitat maps to prioritize potential habitat for plants of concern and to plan surveys. Individual species requirements were reviewed and appropriate modeling criteria selected to determine which species or corresponding habitat would be expected to occur in the project area.

The basic mapping unit used is the Habitat Type Group (HTG). This classification groups similar forest habitats into functional categories based upon vegetative type, moisture and temperature characteristics. For some species, these units are useful to match species criteria to potential habitat. For other species, the Habitat Type Group itself may not be a good indicator of suitable habitat, but may provide the microsites the species requires. Other species may have more specific habitat parameters that enable more precise modeling than the HTG.

Using GIS, the habitat units important to sensitive plants were identified and mapped for the project area. Locations of the proposed activities were evaluated against the habitat groupings to determine which activities would occur in those habitats. Each activity occurring in potential habitat was evaluated based on the criteria important for each species. Forest personnel have surveyed large portions of the project area for the presence of sensitive plant species and determination of suitable habitats.

Based on the results of research, field work and GIS analysis, direct and indirect effects are discussed for each species. Direct effects could result from vegetation management, road activities (including decommissioning), and fuel treatments. Indirect effects for some species may include the expansion of weeds and the mitigating treatments of these infestations or changes to the forest canopy that may affect light and temperature regimes. Cumulative effects are the overall effects to species from past, present and reasonably foreseeable future projects. Historically such effects on individual species were not measured or noted. However, the past effects on general habitat condition can be qualified and matched to species dependent on a particular habitat. Finally, the effect on potentially suitable habitat was the primary indicator used in the analysis.

1. Direct and Indirect Effects

Alternative 1

Since there are no management activities proposed under this alternative, there would be no direct effects on plant species or habitats. However, changes in stand structure would be expected through time, some of which would alter habitats that are suitable for some sensitive plant species. In some cover types, forest openings may occur as seral species decline. In more mixed-conifer forest types, succession would continue to progress, resulting in a decline in size and frequency of small openings and forest gaps.

In general, species requiring later seral forests would see an improvement in habitat quality, and species with poor dispersal mechanisms would have an increased opportunity for establishment. Species requiring more open conditions would decline, baring the absence of significant fire or other forest clearing event such as severe wind or disease. The increased severity of wildfire is possible due to the increased fuel build up in areas of past fire exclusion.

Management Activities

The primary management activity that may affect species or habitats of concern would be timber harvest, particularly the regeneration harvests that subject the habitat to more mechanical disturbance and alter the light, temperature and moisture regimes that determine distribution for most plants. Early seral species may do well with such changes, but later seral species would decline or be locally extirpated. The implementation of commercial thinning has some potential for direct mechanical harm, but the overall habitat conditions likely would not change enough to harm most late seral species. Habitats preferred by late seral species generally are closely tied to riparian areas that are excluded from proposed units.

Prescribed fire is generally implemented under moderated conditions that allow fuels to be treated without displacing large areas of forests. While effects to plants on the ground can be significant at implementation, the overall habitat through time is not substantially changed. Plants may be lost, but the habitat largely left intact. However, some localized areas may burn severely and result in significant ecological changes. Species requiring more open habitats such as grasslands or savannahs could benefit from fire that reduces conifer or brush encroachment. Invasive weeds could increase in such areas as a response to the disturbance. For each action alternative, habitats for sensitive plant species would undergo a mix of beneficial to detrimental effects depending upon the severity and placement of fire and the individual species ecology.

Precommercial thinning outside of RHCAs would thin dense stands allowing for release of remaining trees. This activity would occur in relatively young habitats that do not provide habitat for most sensitive plant species. Earlier seral species may occur in these areas, and individuals may be mechanically harmed by this activity. However, the general habitat and structure of the stand would be maintained. Small tree thinning to within 25' of streams may come in contact with those species tied to moist habitats. However, the manual operation of this treatment with little, if any, ground disturbance would be expected to minimize any disturbance to sensitive plants.

Decommissioning and reconstruction of existing roads are viewed as maintaining current conditions from the perspective of suitable habitat for rare and sensitive plants. Generally, old roads that are candidates for decommission do not provide any habitat for species of concern. Where these routes cross streams or low moist areas, there is the possibility for negative mechanical effects to any occurrences or suitable habitat that may be in the immediate vicinity of the road. However, such effects would be anticipated to be rare and negligible, because the work would be almost entirely limited to the road crossing itself with little impact to the adjacent grounds.

The construction of temporary roads (proposed under Alternative 2 only) are a direct disturbance to suitable habitats. It is assumed that for each mile of temporary road constructed, approximately 2.5 acres of habitat would be reduced over the short term.

Action Alternatives

The effects analysis is based on evaluation of the above proposed management activities occurring in potentially suitable habitat and the potential for those activities to directly or indirectly effect plant populations or habitat characteristics. For all species, the proposed actions of Alternative 2 would affect more potentially suitable habitat than that affected by Alternative 3.

Determination of effects on sensitive plant species by management activities of this project are summarized by alternative in the table that follows. Only those plant species with potential habitat that may be affected are included in the table.

Table 4.10 – Summary of Effects for Sensitive Plant Species

Sensitive Plant Species	Effects Determination			Percent of Habitat Affected by the Action Alternatives[1]
	Alt 1	Alt 2	Alt 3	
Deerfern *Blechnum spicant*	NI	MI	MI	3%
Green bug-on-a-stick *Buxbaumia viridis*	NI	MI	MI	6%
Constance's bittercress *Cardamine constancei*	NI	MI	MI	16%
Clustered lady's-slipper *Cypripedium fasciculatum*	NI	MI	MI	2%
Naked rhizomnium *Rhizomnium nudum*	NI	MI	MI	6%
Evergreen kittentail *Synthyris platycarpa*	NI	MI	MI	2%

Sensitive Species Determinations: NI = No Impact; and **MI** = May impact individuals or habitat but not likely to cause trend toward federal listing or reduce viability for the population or species.

[1] The percent of suitable habitat affected that would likely displace plant species or alter habitat would range from 0-2%.

2. Cumulative Effects

Discussion of cumulative effects for rare plants is addressed through the general trend of the suitable habitat required by these species as a result of past, present and future management actions. Because all of these species occur predominantly in the moist western red cedar habitats that are so dominant in the project area, the species have been grouped for this analysis.

Geographic Boundary: The area of consideration for cumulative effects includes both public and private lands within the entire project area (21,560 ac). The rationale for this is that the effects are site specific to areas treated within the project area and will not extend beyond the boundaries, and effects from outside the defined area will likewise not affect the resource within.

Time Frame: These effects are considered only for the species potentially affected by this project and from the initial habitat transformations in the early 1900s through the proposed and reasonably foreseeable future.

Past, Present, and Foreseeable Future Actions: The primary management activities that have influenced rare plant habitat in the Orogrande Creek watershed and continue to under this project include past and present timber harvest, road, and road construction. Timber harvest on National Forest lands within the area started in the 1960s, with even-aged management as the primary method. Since the 1980s, trends of harvest activity have significantly declined with a corresponding decline in effects to plant habitat. In addition, advancement in harvest operations and logging technology has further reduced resource impacts.

To facilitate logging, 364 miles of roads have been constructed over time within the project area. This construction generally mirrors timber harvests with the large majority occurring in the 1960s, less in the following decades and relatively few in the 2000s. Many of these roads are no longer used and have become overgrown. Over the years, some roads have received various levels of maintenance and reconstruction, and thirty-four miles have been decommissioned since 1998.

There are approximately 20 miles of trails constructed in the project area. The effects trail work on sensitive species habitats is generally negative, but very small. Ongoing maintenance of these travel routes is considered routine and ongoing, with virtually no effects to the habitat which they pass through.

Future foreseeable activities only include the Orogrande OHV Trail project that will largely utilize existing roads to provide a motorized recreational route. A few short reaches of new trail construction will connect some gaps in the existing tracks. Field surveys of the proposed new sections found some suitable habitat, but no occurrences of any sensitive species were found. The construction of these links will collectively involve less than an acre of suitable habitat for any given species, thus the cumulative effects contributed by this foreseeable action is very small.

<u>Alternative 1</u>

The no action alternative would produce no additional effects on potential rare plant habitat, as compared to past activity levels. The progression of forest succession would improve habitat for most sensitive plant species. However, the decline of successional tree species due to insect-caused mortality may cause localized openings and increases in light and fuel loads, which could lead to more intense wildfires and resource damage. In such cases, older habitat favored by these species could see localized declines, but the trend overall would be one of increasing habitat suitability.

Alternatives 2 and 3

Both of these alternatives add short-term disturbance to the landscape through harvest activities and temporary road construction. These activities along with ongoing activities would result in a slight decline of potentially suitable sensitive plant habitat for some species. Long-term trends would be static to slightly downward. A slight downward trend in habitat quality would not lead to concerns for population viability, since these habitats are common in much of the analysis area.

Consistency with the Forest Plan and Environmental Law: The forest plan states that no action will be taken that will jeopardize a threatened and/or endangered species. As stated under the regulatory framework, the objective for managing sensitive species is to ensure population viability throughout their range on National Forest lands and to ensure they do not become federally listed as threatened or endangered. The forest plan supports this direction but does not set specific standards and guides for sensitive plants. The alternatives are consistent with this direction to the extent that proposed management actions would not adversely affect viability of existing sensitive plant populations or habitat.

VI. Transportation (Ref: Lower Orogrande Transportation and Access Analysis Report)

This section addresses the effects of proposed road decommissioning, road reconstruction and recondition, and access restrictions on the area's transportation system.

A. Direct and Indirect Effects

Alternative 1 (No Action)

Under the No Action alternative, there would be no direct or indirect effect to transportation and access throughout the entire analysis area. The existing National Forest Transportation System would remain at current levels. National Forest visitors would have the ability and opportunity to continue with existing recreation activities. However, no roads in the project area would undergo any road reconstruction or improvement, potentially hindering the ability for enhanced and easier access for users.

Alternatives 2 and 3

Number of miles of system road decommissioned: Both alternatives would decommission 16 miles of the approximately 224 miles of National Forest System (NFS) roads in the project area. This would result in a 7% reduction of road miles available for visitor use. Decommissioning the roads identified in this alternative would pose some inconvenience for visitors, plus eliminate the ability for users to access locations they have historically visited (only 2 miles proposed for decommissioning would change from "Open Year Round to Small Vehicles" to decommissioned status). However, with the majority of system roads in the project area still open to use, the majority of access would still be available resulting in a nominal impact to area users. Additionally, further minimizing the impact to visitors is the fact that the vast majority of roads that are proposed for decommissioning in this alternative are currently Restricted Year Round to all vehicles.

The exception to this is proposed decommissioning of an approximately 2-mile section of NFS Road 660. The proposed decommissioning would begin just past the junction of NFS Road 5240 and continue towards NFS Road 547 for approximately two miles. This decommissioning would eliminate a currently existing thru route along the NFS Road 660 from NFS Road 250 through Sylvan Saddle to NFS Road 5215. This action would alter existing transportation and access patterns for a number of visitors to this portion of the North Fork Ranger District as it is a highly visible, well-known route with a moderate to high level of use. Alternative 2 would minimize the effects of this through development of a thru-route on NFS Road 547, which is discussed below.

Number of miles of non-system road decommissioned: Both alternatives would decommission 73 miles of the approximately 97 miles of non-system roads in the analysis area, resulting in a 75% reduction of non-system road miles. It is important to note that virtually all of the non-system roads within the analysis area are, and have been, almost completely overgrown for some time now. Therefore, use of these roads in terms of a transportation system is non-existent. Transportation would not be hindered as a result of decommissioning these roads.

Number of miles of road reconstruction/improvement: Both alternatives would reconstruct/improve between 11.6 and 14.7 miles of the approximately 224 miles of NFS Roads in the analysis area. Although this activity would facilitate removal of forest products, there would be a long-term benefit to the transportation system with improved access on the specific miles identified. This has the potential to increase use of the transportation system in the specific geographic locations where the proposed road reconstruction and/or improvement would take place.

One particular road of note that is planned for reconstruction is NFS Road 547. Under both Alternatives, approximately 3.9 miles of this road is proposed for reconstruction for watershed benefit. This action would allow for full-size vehicles to have a thru-route connecting to NFS Road 250. This would replace the existing thru-route on NFS Road 660 thereby greatly reducing the effects of NFS Road 660 proposed decommissioning work.

Number of miles of road reconditioning: Both alternatives would recondition 20.2 miles of the approximately 224 miles of NFS Roads in the analysis area. The effect to transportation in the project area would be similar as identified above in the road reconstruction/improvement section.

Number of miles of year-round road restrictions: Both alternatives would implement year round road restrictions on 14.5 miles of NFS Roads in the analysis area. This totals approximately 7% of the NFS Roads located in the project area. Currently, the majority of the roads proposed for a year-round restriction are closed to large vehicles and open to small vehicles. The only exception is NFS Road 5216 (Tamarack Face, 6.5 miles), which currently does not have restrictions in place. This may result in some relatively minor impact to transportation and access for visitors. The visitors it may impact the most are those who are utilizing ATV's for transportation within the analysis area. The mileage available to them is reduced somewhat with this alternative.

B. Cumulative Effects

Geographic Boundary: The boundary evaluated for cumulative effects on recreation encompasses the Lower Orogrande analysis area.

Time Frame: The time frame for the evaluation of cumulative effects is 10 years following implementation of the project, when the public's adjustment to access changes would be complete. It is also the time it would take for closed and decommissioned roads to be adequately revegetated to provide natural closures to roads closed year long.

Past, Present and Foreseeable Actions: Past actions are included in the description of the existing condition in Chapter 3. The Clearwater National Forest recently completed Travel Planning to implement the 2005 Travel Management Rule. The Record of Decision, signed 11/10/11, affects motorized recreation in a variety of ways, including cross-country travel and the seasons of use and types of vehicles that are allowed on roads throughout the analysis area and the forest.

Another foreseeable future action is the Orogrande OHV Trail project that would utilize existing roads and trails and combine short sections of new trails to provide users with a new OHV loop trail system. It is expected that this new trail system would increase motorized use in the analysis area, both from large vehicles (allowing visitors to access the trail system), as well as small trail vehicles (four-wheelers, motorcycles). However, this increase in use is not expected to appreciably raise the number of vehicles on area NFS Roads to an unreasonable level.

Lastly, the reconstruction and repaving of NFS Road 250 (a project funded by the American Recovery and Reinvestment Act), which is located outside of the analysis area, may have some short and long-term impacts to recreation use within the analysis area. In the short-term, recreationists may be affected by road delays and possible road closures, thereby preventing access to recreation opportunities in the project area. However, in the long-term, improvements to NFS Road 250 may encourage more recreation use throughout the area, increasing the amount of motorized activity, dispersed camping, firewood gathering, etc. occurring throughout the analysis area.

VII. Tribal Treaty Rights

The Nez Perce Tribe reserves the exclusive right of taking fish at all usual and accustomed places together with the privilege of hunting, gathering roots and berries. The following estimates the effects of proposed treatments on these tribal activities:

A. Fishing

1. Direct and Indirect Effects

Alternative 1: Current recovery trends would continue in the area's streams. However, some existing roads would continue to contribute sediment to area streams.

Alternatives 2 and 3: Proposed activities are not likely to affect the ability of Nez Perce Tribal members to exercise their right to fish within and near the analysis area. Effects upon fish habitat are expected to be minimal, not likely to affect fish populations.

Riparian buffers (INFISH) would be implemented under each alternative, and watershed modeling shows watersheds affected by proposed activities meeting Forest Plan Standards and the 1993 Forest Plan Lawsuit Settlement Agreement. Also, there are watershed improvement activities (road decommissioning and culvert replacements) common to each alternative that have the potential to benefit fish habitat.

B. Hunting

1. Direct and Indirect Effects

Alternative 1: There would be minimal impacts to Tribal hunting. Elk summer habitat effectiveness would average 48%, which is above the minimum Forest Plan standard of 25%. Available forage and hiding cover would remain at existing levels, with forage being more limited. Hunting opportunities for tribal members should continue at current levels.

Action Alternatives: Both of these alternatives would slightly decrease overall elk summer habitat effectiveness to 47%, which is still above the Forest Plan standard of 25%. Available forage would increase, as would elk security area. Overall effect on hunting opportunities is expected to be minimal.

C. Gathering Activities

1. Direct and Indirect Effects

Alternative 1: Camas plants are located in the Oxford meadows area. Cous/cous, used for medicinal purposes, can be found in the East Fork of Bear Creek. Kinnickinnic plants, in which the leaves are used to make a tea that acts as a blood thinner, can be found in disturbed areas, such as road cuts. Berries, such as huckleberries and elderberries, are also common throughout the analysis area. All of these sites would remain in their current condition.

Action Alternatives: No activities are proposed on or near any meadows or wetlands that would affect camas or cous/cous sites. Kinnickinnic plants could be disturbed with proposed road decommissioning, especially where old road cuts would be recontoured and revegetated. Timber harvest and/or prescribed fire activities would have a short-term negative impact on berry bushes, although in the long-term, studies show enhanced growth of berries after burning. Mushrooms also flourish after a fire. Overall, the impact on Tribal gathering activities should be minimal and potentially beneficial.

2. Cumulative Effects on Fishing, Hunting, and Gathering Activities

Geographic Boundary: The cumulative effects boundary would consist of the Orogrande Creek watershed, since the effects of proposed actions would be negligible outside of this area.

Time Frame: 15 years after project implementation.

Past, Present, and Foreseeable Future Actions: Past actions include timber sale activities and road construction. There are no present actions that could possibly have an effect on fishing, hunting, or gathering activities. The only foreseeable future action that might affect Tribal Treaty Rights would be the Orogrande OHV Trail project and Forest Travel Planning decision.

Alternative 1: There are no cumulative effects related to the No Action alternative since cumulative effects can only arise from the incremental impact of an action when added to other past, present, and reasonably foreseeable future actions. There are no actions associated with this alternative.

Alternatives 2 and 3: Cumulatively, all past timber harvest and road construction within the analysis area contributed to the existing conditions for Orogrande Creek and associated fisheries. Timber sales since 1995 have implemented INFISH buffers that are designed to minimize sediment risk to fish, including those fish species valued by the Tribe.

The Orogrande OHV Trail project affects portions of the Lower Orogrande analysis area. However, the Environmental Assessment for that project states that “there would be no effect from the proposed activities on the treaty rights of the Nez Perce Tribe.” Thus, there would be no cumulative effects when added to the proposed activities of this project.

The Clearwater National Forest recently completed Travel Planning to implement the 2005 Travel Management Rule. The Record of Decision, signed 11/10/11, affects motorized recreation in a variety of ways, including cross-country travel and the seasons of use and types of vehicles that are allowed on roads throughout the analysis area and the forest. As stated in the Travel Planning EIS; “All of the action alternatives would maintain access to areas important to all American Native Tribes who use the Clearwater National Forest, and would preserve local Native American culture by providing for the continued ability to practice inherent tribal treaty rights and traditional uses of the forest.”

VIII. Economics (Ref: Lower Orogrande Economic Analysis)

The scope of this analysis is focused on costs and revenues (stumpage value) associated with the implementation of the Lower Orogrande project. The project specific area of analysis is located within Clearwater County; however, timber harvested under any "action" alternative could be processed anywhere within the region. For the purpose of this analysis, the affected environment for economic direct, indirect and cumulative effect considerations includes the Clearwater, Latah and Nez Perce counties. Communities that may be affected include Elk River, Potlatch, Deary, Bovil, Julietta, Orofino, Pierce, Weippe, Kamiah, Kooskia, Troy, Lewiston, Moscow and Chilco, Idaho and Clarkston, Washington.

This analysis includes costs and revenues associated with all harvest and activities proposed. The breakdown of specific cost and revenues is included in the detailed analysis, which is located in the project record.

A. Analysis Method

The Clearwater National Forest Plan FEIS, p. IV-30-32, describes the economic impacts of implementing the Forest Plan (USDA Forest Service, 1987). This analysis tiers to the Forest Plan EIS Appendix B, specifically pages B-30 through B-62, which address the economic analysis process and values placed on non-consumptive items such as recreation opportunities, community stability, cultural resources, habitats, and populations. This economic analysis does not revisit the information presented in the Forest Plan and focuses only on those costs and revenues associated with implementing the proposed activities in the Lower Orogrande project area.

Economic conditions are constantly changing locally, regionally and nationally, and market prices fluctuate widely. The appraised value, the issue indicator of a cost efficient timber sale and possible funding of proposed watershed improvements, was determined by utilizing the Residual Value (RV) appraisal method. The RV method predicts the stumpage value through the use of several independent variables developed by predicting the value of the timber, on the stump, and reducing that value based on the costs associated with logging, environmental protection, reforestation, etc. Production costs for logging and associated work are periodically updated within the system. Current local Delivered Log Prices are entered manually by the user. The combination of these variables is reflected in the predicted stumpage rate. It should be noted that stumpage values fluctuate with the market, which would affect the advertised value and bidding for this project at the time a sale is ultimately offered in the future.

The Quicksilver financial efficiency analysis was also used to calculate the present net value (PNV) of each alternative. The PNV compresses the flow of costs and benefits over time into an equivalent, single time period. An alternative with a positive PNV has benefit values exceeding costs, whereas, an alternative with a negative PNV has costs in excess of benefit values. It should be noted that the PNV includes the costs of the NEPA analysis and timber sale preparation and administration, which are sunken costs not affected by the appraised value of the timber sale offering.

B. Direct and Indirect Effects

This economic analysis is based on static, average information in a dramatically fluctuating market and is provided to display the relative difference between alternatives. A variety of factors can change unexpectedly, increasing or decreasing the value of any alternative at any time. The analysis of all economic effects is limited to the Lower Orogrande project area.

The action alternatives have the potential to provide employment opportunities, some of which possibly for members of the local communities. Although difficult to predict, local employment increases due to this project might include work in logging and fuel treatment projects, trucking activities, wood product mills, road maintenance and reconstruction, and possibly post-harvest service work.

The Lower Orogrande project, as with all timber harvest and restoration projects, is being considered all or in part as a Land Stewardship Project under the 2014 Farm Bill. Stewardship contracting is one of the tools that can be used to implement project activities but would allow flexibility in combining traditional service and timber sale contract activities to more effectively accomplish ecosystem restoration through forest management. Mechanisms used in land stewardship approaches include: (1) bundling of a variety of management tasks within a single contract; (2) multiple-year contracts; (3) long-term cooperative agreements; and (4) contract performance based upon descriptive end-results. Flexibility in funding is also part of the process that can include partnerships or infusing appropriated or other funds into the contract in accomplishing the restoration work.

The use of stewardship contracting could add more jobs doing post-sale service work, both direct and indirect. However, stewardship projects would not contribute any revenue to the Treasury or to the 25% Fund for Clearwater Counties, as with traditional timber sale contracts.

The following table displays the costs and revenues generated by each alternative. Costs displayed for the timber harvest reflect stump-to-mill including harvest and associated activities. The unit of measure for activities related to forest timber product removal is CCF, which is defined as 100 cubic feet of solid wood. One cubic foot of solid wood is described as 1 foot wide, by one foot thick, by one foot long.

Table 4.11 – Advertised Value and non-sale related costs

Alternative	Volume (CCF)[2]	Stumpage Value[3]	Base Value[4]	Appraised Value[5]
Alt. 1 No Action	0	$0.00	$0.00	$0.00
Alt. 2	17,963 (9,879 MBF)	$1,046,813	$434,510	$612,303
Alt. 3	6,133 (3,337 MBF)	$203,640	$174,438	$29,202

[2] Volume represents total Sawtimber volume expected to be harvested.
[3] Stumpage Value = appraised stumpage rate x volume (CCF); Stumpage rate = value of timber – (stump to mill costs + Environmental Protection costs).
[4] Base Value = Bate Rate x Volume (CCF); Base Rate represents the cost per CCF to cover Knutson – Vandenburg costs (reforestation).
[5] The appraised value represents the Stumpage Value - Base Value.

Alternative 1 – No Action: This alternative harvests no timber, generates no revenues, and incurs no expenses from timber sale preparation and administration. No jobs or income are generated.

Alternative 2: This alternative has a stumpage value of $1,046,813. After subtracting the base value that includes the costs of reforestation, the resulting appraised value equals $612,303. This represents a **positive** sale offering. The financial viability of Alternative 2 suggests that value exists to entertain the opportunity to implement with an Integrated Resource Stewardship Contract and complete a portion of the non-sale related activities. Current guidance is to utilize up to 75% of the value above base rates for including mandatory service work items. The value above base rates for alternative #2 is approximately $612,303 which would equate to approximately $459,227 available for mandatory service work.

Alternative 3: This alternative has a stumpage value of $203,640. After subtracting the base value, the resulting appraised value equals $29,202. This represents a **positive** sale offering. The financial viability of Alternative 3 suggests that value exists to entertain the opportunity to implement with an Integrated Resource Stewardship Contract and complete a portion of the non-sale related activities. Current guidance is to utilize up to 75% of the value above base rates for including mandatory service work items. The value above base rates for alternative #3 is approximately $29,202 which would equate to approximately $21,901 available for mandatory service work.

The financial assessment, as analyzed and displayed above, indicates that the alternatives represent positive sales (sales where revenue exceeds expenditures). However, a variety of factors can change unexpectedly, increasing or decreasing the value of any alternative at any time. All cost variables used in this assessment are estimates that reflect current market values and current cost estimates that are reasonable at this time.

PNV Analysis: The Quicksilver financial efficiency analysis was used to calculate the PNV of each alternative. The benefit value included the anticipated predicted high bid that represents the appraised value inflated with the Forest overbid. The PNV for each alternative is displayed in the following table:

Table 4.12 – Present Net Value

Alternative	Sawtimber Volume (CCF)	Benefit Value	Total Costs	PNV
Alt. 1 No Action	0	$0.00	$368,607[6]	($368,607)
Alt. 2	17,963	$1,757,307	$950,607	$806,700
Alt. 3	6,133	$472,300	$746,907	($274,607)

[6] This represents the cost of the NEPA analysis, which is also included under Alternatives 2, 3, and 4.

As can be seen in the above table, each alternative has a positive PNV, in which benefit value of the project exceed cost values. Of the three alternatives, Alternative 2 best surpasses the sunken costs of the NEPA analysis, timber sale preparation, and administration.

C. Cumulative Effects

Geographic Boundary: Clearwater, Idaho, and Nez Perce Counties.

Time Frame: 10 years after project implementation - the expected life of the project.

Past, Present, and Foreseeable Future Actions: Past actions in the study area include road building and timber removal activities, which were used to describe the existing condition. Present and foreseeable future actions include the Forests 5-year timber sale plan, commercial thinning in stands that are too small and young to thin at this time. Also, it is likely that as some stands continue to develop there will be a need to do additional regeneration harvest to manage for disease and insects. The 5-year timber sale plan (FY15-19) for both Forests, which includes this project plus French Larch and Barnyard South Sheep, is estimated at 70 MMBF per year.

Alternative 1: There are no cumulative effects related to the No Action alternative, since cumulative effects can only arise from the incremental impact of an action when added to other past, present, and reasonably foreseeable future actions. Since this alternative does not propose any timber harvest or other activities, it would not contribute cumulatively to the local community jobs and income.

Alternative 2: Added to the Forests 5-year timber sale plan, this alternative would have the most beneficial economic effects on the local communities by creating jobs and income, which could put unemployed woods workers back to work or draw out of town workers to the communities. In the context of the Forests' 5-year Timber Sale Plan, this alternative would represent 17% of the timber sale program for FY-2016.

Alternative 3: This alternative would have the least amount of beneficial economic effects on the local communities compared to Alternatives 2. In the context of the Forests' 5-year timber sale plan, this alternative would represent 5% of the timber sale program for FY-2016.

D. Regulatory Framework and Management Direction

Executive Order 12898 requires an analysis of the impacts of the proposed action and alternatives on minority and low-income populations. The order is designed in part "…to identify, prevent, and/or mitigate, to the greatest extent practicable, disproportionately high and adverse human health or environmental effects of United States Department of Agriculture programs and activities on minority and low income populations…".

None of the action alternatives are expected to negatively affect the consumers, civil rights, minority groups, American Indians, women, or any United States citizen. Subsistence activities would not have a disproportionate impact on minorities or low-income individuals. No environmental health hazards are expected to result from implementation of any alternative. This project should not disproportionately affect income level.

Consistency with the Forest Plan: The following Forest-wide direction for natural resource products from among those listed within the Clearwater National Forest Plan applies to this project and would be met as follows:

Table 4.13 – Forest Plan Compliance

Goal #	Subject Summary	Compliance Achieved By
9a.	Provide a sustained yield of timber and other outputs at a level that is cost-efficient and that will help support the economic structure of local communities and will provide regional and national needs.	The Lower Orogrande project would provide forest material outputs and potential service or stewardship contract work.
9b.	Select on the ground those silvicultural systems that will be the most beneficial to long-term timber production, but modified as necessary to meet other resource and management area direction.	Silvicultural prescriptions identified for the Lower Orogrande units are designed restore white pine and larch to improve stand vigor and species diversity across the landscape to create stand conditions that are resilient and allow for rapid recovery after disturbances.
Objective Number	**Subject Summary**	**Compliance Achieved By**
8	…The annual program of sale offerings may range from 120 million board feet to 200 million board feet during this period.	The Lower Orogrande project would contribute approximately 3.3 – 9.9 MMBF (alt 2 - 3 respectively) toward sale offerings as early as 2016.
8b	Maintain a mix of sale offerings including various logging systems needed to implement the Forest Plan and support local and regional logging system capabilities.	Ground based (tractor or cut-to-length) and skyline/cable logging is currently economically efficient and Lower Orogrande includes a mix of both of these logging systems.
Standard Number	**Subject Summary**	**Compliance Achieved By**
7a.	Require silvicultural examination and prescriptions before any vegetative manipulation takes place….	Silvicultural prescriptions would be completed before any sales are offered for sale.
7b.	Design timber sales to consider cost-effectiveness while maintaining the long-term sustained yield and protecting the soil and water resources.	The Lower Orogrande project has been designed to balance economical timber harvest with protection and/or enhancement of other resource values.
7g.	Perpetuate western white pine as a commercial tree species.	Silvicultural prescriptions identified for the Lower Orogrande units are designed to restore white pine and larch to improve stand vigor and species diversity across the landscape to create stand conditions that are resilient and allow for rapid recovery after disturbances.

Standard Number	**Subject Summary**	**Compliance Achieved By**
7h.	Plan for adequate restocking on all lands managed for timber within five years after final removal.	All stands identified for regeneration harvest would be planted with base rate collections from the timber sale or through mandatory service work with stewardship contracting.
Management Area Direction	**Subject Summary**	**Compliance Achieved By**
E1 Goals	Provide optimum, sustained production of wood products. Timber production is to be cost effective and provide adequate protection of soil and water quality. Manage viable elk populations within areas of historic elk use based on physiological and ecological needs. Manage a range of water quality and fish habitat potential….	The Lower Orogrande project would contribute approximately 3.3 – 9.9 MMBF (alt 2 - 3 respectively) toward future sale offerings. The project has been designed to balance economical timber harvest with protection and/or enhancement of other resource values.
E1 Standard a.	Schedule timber harvest using logging and silvicultural methods appropriate for the stand and the terrain.	The logging system analysis matched the logging system to the terrain. The Silviculturist has preliminary stand diagnosis that prescribe the appropriate treatment relative to the desired future condition, as represented in the purpose and need for this project.
E1 Standard b.	Maintain stocking control commensurate with the level of management intensity.	Reforestation needs identified in the SAI plan would match the diagnosis and ultimately the silvicultural prescription.
E1 Standard c.	Identify and maintain suitable old-growth stands and replacement habitats for snag and old-growth dependent species in accordance with criteria in Appendix H.	Old growth, replacement and step-down old growth have been identified and the effects to old growth dependent species is discussed in the environmental analysis/document.

CHAPTER 5

LIST OF PREPARERS

The following individuals participated in the analysis and preparation of this document:

Interdisciplinary Team (IDT)

George Harbaugh – Natural Resource Planner (Team Leader)

Karen Smith – Lochsa Fisheries Biologist

Andre Snyder – Hydrologist

Dan Kenney – Fisheries Biologist

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Adam McClory – North Zone Recreation Staff Officer

Marcus Chin – North Zone Silviculturist

Jeff Lau – North Zone Timber Management Assistant

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Travis Mechling – District Engineer

Clare Brick – Silviculture Forester (Noxious Weeds)

Mike Lubke – North Fork Fire Management Officer

Amy Larson – Central Zone Presale Forester (Fuels)

Meg Foltz – Palouse Hydrologist/Soil Scientist (since retired)

Robbin Johnston - Archeologist

John Hutchison – North Zone GIS/Data Base Specialist

CHAPTER 6

PUBLIC INVOLVEMENT

This chapter discusses public involvement conducted during the Lower Orogrande analysis. Included are: (A) public participation opportunities; (B) Tribal consultation; (C) a list of those who commented on the revised Draft EIS; (D) comments received and our response; and (E) consideration of other science/literature submitted by the public.

A. Public Participation Opportunities

The Lower Orogrande project has appeared on the Forest Schedule of Proposed Action report since 2008. Since then the following public involvement activities have taken place:

- 12/24/09 – Scoping letters were mailed to the general public. Eight letters were received.
- 12/24/09 – A legal notice appeared in the Lewiston Morning Tribune (paper of record).
- 01/8/10 – A Notice of Intent (NOI) to prepare an environmental impact statement for the Lower Orogrande project was published in the Federal Register.
- 06/3/11 – Original DEIS was released for 45-day public comment period.
- 12/9/11 – FEIS and ROD released to public, initiating 45-day appeal period.
- 02/27/12 – Forest Supervisor Rick Brazell withdrew the decision in favor of rewriting the DEIS.
- 10/23/12 – Letters and/or copies of the revised DEIS were mailed to interested publics, organizations, and State and Federal agencies.
- 11/2/12 – A legal notice appeared in the Lewiston Morning Tribune (paper of record) requesting comments on the revised DEIS.
- 04/05/13 – FEIS and ROD released to public, initiating 45-day appeal period. Although appealed, the decision was upheld, and implementation of the project (mostly timber sale layout) began in the fall of 2013.
- 11/06/13 – A NOI to Sue under the Endangered Species Act (regarding Canada lynx and grizzly bear) was received from the previous appellants.
- 02/10/14 – Forest Supervisor decided to withdraw the 2013 Decision in favor of updating the lynx analysis.
- 11/28/14 – A legal notice appeared in the Lewiston Morning Tribune announcing the release of a draft ROD and the start of the 45-day Objection period. An Objection was received from the former appellants.

B. Tribal Consultation

In addition to the opportunities listed above, the following consultation occurred with the Nez Perce Tribe:

10/08 to present – The Lower Orogrande project was presented, with follow-up updates, at the Nez Perce and Clearwater National Forests and Nez Perce Tribe quarterly staff-to-staff meetings.

12/24/09 – Scoping letters were mailed to the Nez Perce Tribal Executive Committee. No response was received.

10/23/12 – Copies of the revised Draft EIS were delivered to the Nez Perce Tribe Chairman and staff. No comments were received.

C. List of Those who Commented on the DEIS

The public was given 45 days (November 2, 2012 – December 17, 2012) in which to provide comment on the DEIS. Seven letters were received from the following individuals, agencies, and organizations:

1. Jean Public, Flemington, NJ, who provided no comments specific to the DEIS.
2. Dick Artley (DA), Grangeville, ID, who requested we consider his list of opposing views.
3. Idaho Department of Parks and Recreation (IDPR) – submitted by Jeff Cook, who requested that we include his previous comments.
4. U.S. Department of the Interior, Office of Environmental Policy and Compliance – submitted by Allison O'Brien, who had no comments to offer.
5. U.S. Environmental Protection Agency (Region 10) – submitted by Christine Reichgott, who rated the revised DEIS LO (Lack of Objections).
6. Idaho Conservation League (ICL) – submitted by Jonathan Oppenheimer, who provided new comments.
7. Friends of the Clearwater, Alliance for the Wild Rockies & The Lands Council (FOC) – submitted by Gary Macfarlane and Jeff Juel, whom requested that we include their previous comments.

D. Comments Received and Our Response

Access

1. Comment: The DEIS states "or 6.1 miles of road per square mile". This is a misleading statement. The FEIS should clearly state the amount of roads open to motorized vehicles on a year-round or seasonal basis throughout the range of alternatives. (IDPR)

> **Response:** The 6.1 mi/mi^2 figure represents the current road system (approx. 224 miles of open and closed roads) within the project area. This figure is used as an issue indicator for the watershed analysis, and is not meant to describe existing access for motorized vehicles. The figure drops to 3.6 mi/mi^2 under Alternatives 2 and 3. Effects on motorized and non-motorized access are described under the Transportation section on pages 106-108 of the revised DEIS.

2. Comment: We request that the FEIS detail how many miles of road obliteration will be active obliteration (i.e. ripping of roads and full bench recontour) vs. abandonment, or vs. something in between (i.e. pulling of culverts + abandonment + ripping of first 300 feet). (ICL)

Response: Detailed road surveys are still being conducted on roads proposed for decommissioning. The miles of recontour vs. abandonment have not yet been determined; however, based on the topography, the location of the roads, and experience with past decommissioning on the Forest, the majority of roads would be actively obliterated with most receiving full bench recontouring.

Economics

3. Comment: Given the challenges with securing funds to accomplish the watershed treatments, we encourage you to seriously consider Alternative 3. While we do not suggest that the 2.4 miles of temp road as the most critical issue, we do suggest that avoiding the construction of these roads could save money, reduce the likelihood of further appeals, and safeguard environmental resources. (ICL)

Response: Alternative 3 was formulated to address concerns over new road construction, including temporary roads. The cost of temporary roads in Alternative 2 is a very small portion of the total cost, with most of the cost due to current timber market conditions and the inability of the stumpage values to cover all essential reforestation. However, if timber sale offerings on the Forest continue to receive higher bids than predicted, the cost of remaining reforestation work would likely be covered (revised DEIS, p. 110).

4. Comment: It is clear that the logging is below cost. How will it generate money to pay for the watershed improvement projects – road decommissioning and culvert replacement? The stumpage value would cover less than a quarter of any stewardship costs. (FOC)

Response: Any watershed improvement activities not paid for through the sale could be paid for through stewardship retained receipts, through appropriated funds, or through partnerships. The Clearwater has an excellent record of gaining funding through these means where the timber sale may not support all the watershed restoration activities.

NEPA / NFMA

5. Comment: Section 101(b)(4) requires all USFS to support biodiversity. This human manipulation of the natural forest conditions significantly harms the biodiversity of the area. The final NEPA document must contain a section detailing how the diversity of fish and wildlife habitat will be maintained with this project. (DA)

Response: This comment refers to Section 101(b)(4) of the NEPA Statute, which specifically states: "preserve important historic, cultural, and natural aspects of our national heritage, and maintain, wherever possible, an environment which supports diversity, and variety of individual choice." The Lower Orogrande project meets this regulation, as follows:

In compliance with the National Historic Preservation Act, heritage surveys were conducted for this project, and the Forest Archaeologist consulted with the Nez Perce Tribe and the Idaho State

Historic Preservation Office (SHPO). Since the preferred alternative (Alt. 2) has not significantly changed in the revised DEIS, the concurrence letter from SHPO, dated July 22, 2011, still applies to the current analysis.

Maintaining an environment which supports diversity is inherent in the purpose and need statements and the proposed action for this project. For example, the proposed vegetative actions are expected to start the trend to improve species diversity, and the replacement of undersized culverts are aimed at removing barriers to fish passage and other aquatic organisms to allow these species to repopulate historic habitats (refer to revised DEIS, page 4).

6. Comment: How are the new DFCs in the DEIS the same as those in the forest plan? Why wasn't a site-specific plan amendment done to adopt these new DFCs? Thus, isn't this DEIS functioning as a forest plan amendment without going through the legitimate and legal amendment process? (FOC)

Response: The DFCs for the project are more site specific than those found in the Forest Plan, and are based on Forest-wide goals and objectives. They are in response to the current conditions within the project area and give impetus to the purpose and need for action.

7. Comment: The DEIS fails its duty under NEPA to offer and disclose to the public a reasonable range of alternatives that includes scientifically and ecologically sound management proposals. The DEIS does not include an alternative that stays out of riparian habitat conservation areas (RHCAs); it does not fully analyze a watershed restoration alternative; and it does not analyze an alternative that would meet NFMA by restricting openings from logging to 40 acres. (FOC)

Response: Activities affecting RHCAs only pertains to proposed precommercial thinning opportunities, which is common to both action alternatives (refer to revised DEIS, p. 19). Since this activity would have "no effect" on water yield, sediment yield, or fish habitat, there is no need to develop an alternative that avoids the RHCAs. A watershed restoration alternative and an alternative having opening 40 acres or less were considered and eliminated from detailed study, as explained on pages 27 and 28 of the revised DEIS.

8. Comment: The BHROWS document has not gone through the NEPA analysis and decision process to look at a range of alternatives or to consider cumulative impacts. It has not been adopted into the forest plan though the DEIS vegetation goals and DFCs are based on its "recommendations." (FOC)

Response: The Lower Orogrande project referenced the Orogrande Ecosystem Analysis at the Watershed Scale (not BHROWS), but did not tier to it, as suggested by this comment. Instead, this project was guided by the goals, objectives, standards, guidelines, and management area direction of the Clearwater National Forest Plan. All alternatives considered have been found to be consistent with the Forest Plan and other laws and regulations, and has so been documented in the revised DEIS.

9. Comment: The issue of reasonably foreseeable actions/cumulative impacts needs better explanation. For example, the cumulative impact analysis in the economic section of the DEIS refers to the, "Forest 5-year timber sale plan." What timber sales are on this plan? Have all of the sales been through NEPA scoping? What about sales that have not been through scoping but the agency has, at some level, done some planning or design work? (FOC)

Response: There is no connection between foreseeable actions/cumulative impacts in any project specific analysis with regard to the five year timber sale action plan. Its reference in the

Economics cumulative section is to provide the reader a Forest-wide look at the average annual timber volume offered, which in this case is 25 MMBF/year. Sales listed on the five year timber sale action plan include a mix of sales that have a NEPA decision to those that are proposed but have little/no design work completed. Projects/sales on the plan are dropped, added and changed regularly to track adjustments to our NEPA plan and timelines. The five year action plan is an implementation planning tool that does not represent a fixed commitment by the Forest and sales/sale information is tenuous at best. The intent of this plan is to track projects through NEPA in developing a possible implementation strategy. Currently, there are no other timber sales within the Lower Orogrande project area that are on the Forest 5-year timber sale plan.

Recreation

10. Comment: There are several groomed snowmobile trails in the project area. In order to protect snowmobile trail opportunities, we request that no winter logging be allowed for this project. (IDPR)

Response: At this point, it has not been determined if winter logging would occur with this project. If it is determined that winter logging is a method to address vegetative treatments in the area, recreation and vegetation specialists would meet to discuss ways to mitigate the impacts to snowmachine activities in the area. For example, project design could include winter logging in locations where less frequent snowmachine activity takes place, and prohibit it in high use locations (i.e. in the vicinity of French Mountain Saddle).

11. Comment: The logs are likely to be hauled out on the Pierce-Superior Road #250, a major recreation access road on the North Fork Ranger District. In order to prevent conflicts between recreation traffic and logging traffic, the IDPR requests that log hauling be prohibited on weekends and holidays. (IDPR)

Response: Timber haul routes would take into account the impact to other resource areas, including recreation. For instance, project design may identify log haul on less popular roads/routes during the weekend, and focus haul on NFS Road 250 during weekday time periods. There are also contract provisions (i.e. C6.316#) available to prohibit the purchaser or contractor from hauling on weekends and/or holidays. This information would be included in the prospectus for possible purchasers or contractors.

12. Comment: The DEIS makes an incorrect reference to statewide ATV registrations. The DEIS should have referred to current ATV registration figures and only those registrations in North Central Idaho. (IDPR)

Response: The most recent figures on the IDPR website identify that 10,026 ATV's were registered in North Central Idaho during 2011. This was a 0.6% decrease from the number of ATV registrations in the same geographic area for 2010.

13. Comment: We are very concerned with the decommissioning of Road 660. This road is currently a groomed snowmobile trail. The reconstruction of Road 547 could replace this groomed route, but will eliminate an ATV trail opportunity. (IDPR)

Response: We are aware of the potential access issues with the decommissioning of NFS Road 660. If NFS Road 547 is reconstructed, this issue would be mitigated, both for winter use (snowmachine grooming could continue) as well as summer ATV use (a connection route would still be available for users to access additional roads and trails in the vicinity). Also, the Orogrande OHV project would provide for an ATV-only route in the vicinity of the current NFS 547 route (refer to pages 106 and 107 of the revised DEIS).

14. Comment: The DEIS does not address the effects that the road decommissioning and road closures would have on dispersed camping. (IDPR)

Response: Road decommissioning proposed with this project would result in some impact to dispersed camping opportunities within the project area. However, the vast majority of the roads proposed for decommissioning are currently unavailable to users, due to current restrictions or environmental realities. Of the small percentage of system roads proposed for decommissioning (approximately 7% in the project area), the majority are restricted year-round to all vehicles. Additionally, the preferred alternative does identify decommissioning a large portion (approximately 75%) of the non-system roads in the project area. However, it is important to realize that the vast majority of these roads have been completely overgrown for some time now (revised DEIS, p-106). In sum, while there would be some minimal impact to dispersed camping opportunities, the majority of roads in the project area would continue to be available for dispersed camping and other recreational pursuits.

Soils

15. Comment: We are concerned with some of the impacts to soils, especially those units that may approach or exceed regional standards. (ICL)

Response: Unit-specific data for existing detrimental soil disturbance (DSD) from previous activities and post-implementation DSD estimates (Cumulative DSD from Previous Activities and Proposed Activities) are available in Appendix E in the table entitled Summary of Detrimental Soil Disturbance. The soil analysis methodology and basis for DSD estimates from proposed activities are presented in the Soils section of Chapter 4. Although Units 5, 7, 10, 13, and 27 are expected to approach the 15% DSD standard following treatment, design measure #6 (revised DEIS, p-25) would be implemented to ensure each unit stays below the 15% standard. Unit 8, which was listed at 17% existing DSD in the original DEIS, has been modified to exclude from treatment the past mining trenches that were the source of the existing DSD. The modified Unit 8 is now estimated at 6.6% DSD following treatment, well below the Regional standard.

16. Comment: It is unclear how "site-specific live-canopy retention" is consistent with INFISH/PACFISH direction to buffer landslide-prone areas by 100 feet in key watersheds. We encourage you to clarify the design measures in the FEIS and to incorporate specific direction in the ROD to ensure that all RHCA buffers, including landslide-prone areas, are incorporated into the project's layout and design. (ICL)

Response: Design measure #2 (revised DEIS, p-24) would directly result in 100 foot no-harvest buffers in landslide prone-areas, which is consistent with INFISH direction. The analysis for the revised DEIS identified seven units (19-25) that contain notable areas of high landslide hazard. As described in design measure #3, the soil scientist would be involved in these units field during implementation to finalize designation of areas requiring variable live-tree retention or no-harvest buffers.

17. Comment: The analysis in the previous DEIS/ FEIS is a bit different from the current DEIS with regard to soils. This looks strange (and suspicious) to someone reviewing the project. Could you please explain this seeming discrepancy? For example, the acreage to be logged on soils with high landslide potential is large, 326 acres. In the previous EIS, logging would have occurred on 416 acres with high landslide potential, begging the question of where the 90 acres in reduction came from if the only difference is possibly 20 acres of logging? (FOC)

Response: The soils analysis is fundamentally the same for the original DEIS and the revised DEIS, but some results of the analysis are different due to changes in treatments, unit boundaries, design measures and disturbance estimates. Compared to the original DEIS, the revised DEIS shows a 30 acre reduction in regeneration harvest, affecting Units 8 and 19. Units 26 and 30 have also been modified, in which Unit 26 is now included in the 660 acres of precommercial thinning, and Unit 30 has been dropped from the project[1]. See the response to comment #20 that describes changes in disturbance estimates.

Regarding the soil stability hazard analysis for the revised DEIS, the 326 acre figure is the total gross acreage of Units 19-25 produced in the soil stability/landslide hazard analysis. Actual acreage logged or “treated” would be considerably less that this gross acreage after areas requiring live-tree retention are excluded during implementation (refer to pages 64 and 65 of the revised DEIS). As discussed in the response to Comment #16, design measures #2 and 3 would be implemented to mitigate the effects of treatment within these units. This 416 and 326 acre figures in the original and revised DEIS are the result of the soil stability/landslide hazard analysis in the specialist report that used an analysis process based on GIS queries, clips, grouping, sorting and rounding. This process produced slightly different unit acres than the total unit acres presented in DEIS Tables 2-2 and 2-3, but these differences are small and acceptable for use as an indicator and does not compromise the quality and utility of the data produced from the query**.** There are 90 less treatment unit acres on areas with high soil stability/landslide hazards in the current revised DEIS compared to the original DEIS. This reduction is due to changes in proposed treatment of Units 26 and 30. The current figure of 326 acres is correct, with acceptance of the small error inherent in the GIS-based analysis described above.

18. Comment: The acreage to be logged (“treated”) on soils with high landslide potential is enormous--416 acres. Why wasn’t an alternative developed that avoided these areas? Why retain only 50% of trees when 100% canopy cover is needed in the most hazardous areas? (FOC)

Response: As discussed in the response to Comment #17, the acreage to be treated having high landslide potential is now 326 acres, which represents gross acreage. The actual acreage logged or “treated” within these units would be less than this after areas requiring live-tree retention are excluded during implementation (refer to pages 64 and 65 of the revised DEIS).

A separate alternative was not developed, since the Forest has been successful in mitigating the effects of treatment on similar areas, based on field observations. In all alternatives, avoidance of unstable areas will occur. As described in the DEIS in Chapters 2 and 4, design measure #2 would be applied to all activity areas, which would result in 100% live-canopy retention in the most unstable areas. Design measure #3 would be used to assure specific attention to units 19-25, including involvement of a soil scientist on layout.

19. Comment: The past EIS had 50% canopy retention in these units yet the current DEIS has no specific prescription for canopy retention. What is the expected "live-canopy retention" in these high landslide prone areas? (FOC)

[1] There is an error in the revised DEIS, in which both Tables 2.2 and 2.3 still include Units 26 and 30. This error is explained in the Errata contained in this document.

Response: As described in design measure # 2 in the revised DEIS, landslide-prone areas would have 100% live-canopy retention and would include a 100 foot no-harvest buffer around the perimeter of the landslide-prone area. A soil scientist would be involved during layout to finalize designation of areas excluded from harvest and areas of variable live-tree retention (see revised DEIS design measure #3). At the unit-scale in regeneration units 19, 20 and 21, live-canopy retention would range from 100% live-canopy retention in highly unstable areas to 0-30% live-canopy retention on highly stable areas. This range of retention often results in an average 50% live canopy retention across a breakland landtype unit. Commercial thin units 22-25 would have live-canopy retention ranging from 100% live-canopy retention in highly unstable areas to approximately 50% live-canopy retention in the remaining areas of the unit. In addition to the tree-retention measures described in the DEIS, the criteria and rationale for determining the tree-retention requirements are described in detail in the soils specialist report, including a description of the basis of tree retention guidelines on historic fire disturbance patterns. Field surveys (pre and post treatment) by soil scientists have shown that adjusting canopy retention based on landscape features has been very effective in maintaining slope stability (refer to revised DEIS, p-24).

20. Comment: The past EIS suggested that detrimental soil disturbance standard would be exceeded on six units. No such determination is made now. Instead, appendix E lists five units that need design measures to mitigate soil disturbance. (FOC)

Response: The original DEIS actually identified five units expected to equal or exceed the DSD standard of 15%--Units 1, 5, 8, 10, and 19. Changes to disturbance estimates for these units in the revised DEIS are the result of adjustments to unit boundaries, further field and logging systems review, and integration of unit specific design measures. None of these units are expected to equal or exceed the 15% DSD standard following treatment, as described below for each unit:

Unit 1 –Disturbance estimates from proposed activities were updated to more accurately represent the logging access plan and accessibility after field review. A higher percentage of the unit is now expected to be accessed by aerial systems, consequently new disturbance estimates are lower. The cumulative DSD for this unit, displayed in Appendix E, is expected to be 13.8% for Alternative 2 and 11.9% for Alternative 3.

Unit 5 –The cumulative DSD for this unit, displayed in Appendix E, is expected to be less than 15% for both alternatives following harvest activities. This will be achieved with the implementation of design measures #6 and #7 to keep new activity disturbance below the maximum allowable new disturbance estimates listed in Table E-2. Review of proposed logging system, aerial photos and field review indicate adequate opportunities for reuse of existing disturbed skid trails and non-system roads to minimize new soil disturbance. All reused areas will be decommissioned and rehabilitated.

Unit 8 – This unit was modified to exclude from treatment the highly disturbed area occupied by old mining trenches. The cumulative DSD for this unit, displayed in Appendix E, is expected to be 13.3%.

Unit 10 – The cumulative DSD for this unit, displayed in Appendix E, is expected to be less than 15% for both alternatives following harvest activities. This will be achieved with the implementation of design measures #6 and #7 to keep new activity disturbance below the maximum allowable new disturbance estimates listed in Table E-2. Review of proposed logging system, aerial photos and field review indicate adequate opportunities for reuse of existing disturbed skid trails and non-system roads to minimize new soil disturbance. All reused areas will be decommissioned and rehabilitated.

Unit 19 – This unit was reduced by 24 acres to remove an area having very high landslide hazard potential. This adjustment resulted in a decreased existing DSD. The cumulative DSD for this unit, displayed in Appendix E, is expected to be 12%.

21. Comment: What is unclear is whether the 15% standard, regardless of its efficacy, would be exceeded, if only temporarily, before restoration work and decommissioning. (FOC)

Response: This project is designed to not exceed the 15% detrimental soil disturbance (DSD) standard and does not rely on soil restoration and decommissioning work to achieve this. In Appendix E, tables E-1 and E-2 display the existing % DSD and the estimated increase in % DSD from proposed harvest activities and temporary road construction. The sum of these is the estimate of cumulative % DSD after harvest activities and temporary road construction, but before restoration work and decommissioning. Due to the reuse of exiting disturbed areas (design measure #6) followed by rehabilitation and decommissioning (design measure #8), recovery of soil productivity and decreased DSD in currently disturbed areas is expected but is not quantified and incorporated into disturbance estimates.

22. Comment: How are the standards measured and are they adequate to meet NFMA? The DEIS provides little information on what was done except to note that shovel pits were dug. In essence, is what was done for the DEIS consistent with the recommendations in the research cited in chapters 3 and 4 of the DEIS? (FOC)

Response: The analysis methodology section on page 63-64 summarizes the range of tools used in the soils analysis. The analysis is consistent with national and regional guidance and applicable standards would be met during project implementation. Key guiding documents include the *Forest Service Region 1 Approach to Soils NEPA Analysis Regarding Detrimental Soil Disturbance in Forested Areas: A Technical Guide* (USDA 2009) and the *USDA Soil Disturbance Monitoring Protocol* (Page-Dumrose et al., 2009). The R1 technical guide "offers an approach for Forest soil personnel to conduct project level NEPA analysis to assure NFMA productivity requirements are met". The R1 technical guide "provides guidance to Northern Region (R1) soil scientists for project level analysis of the soils resource in areas in forested areas. It provides information on data collection protocols, analysis methodologies, monitoring methodologies, and data management. In particular, this document offers additional guidance related to the Regional Soil Quality standards (FSM 2500 – Watershed and Air Management, R-1 Supplement No. 2500-99-1) for detrimental soil disturbance (DSD)". Regarding the National Forest Management Act (NFMA), the R1 Supplement provides soil quality standards to assure the statutory requirements of NFMA Section 6(g)(3)(C) are satisfied. The soil quality standards protect the "productivity of the land" by setting limits for the degree of detrimental soil disturbance (DSD). The soils analysis for this project used the Forest Soil Disturbance Monitoring Protocol (SDMP) (Page-Dumroese, et al, 2009), which addresses the issue of detrimental soil disturbance (DSD) and provides a methodology with a statistical basis for confidence in the results. In addition to assuring NFMA requirements are met, the SDMP method and the landslide/soil stability hazard analysis were also used to assure Forest Plan standards are achieved (revised DEIS page 67-68).

The following excerpt from the Soils Specialist report appendix contains more detail on the SDMP method :

The Forest Soil Disturbance Monitoring Protocol (SDMP)
R1 Soil Protocol

The Forest Soil Disturbance Monitoring Protocol (SDMP) (Page-Dumroese, et al, 2009) addresses the issue of detrimental disturbance and provides a statistical basis for confidence in the results. (USDA Forest Service, 2007) A randomized transect method sampling of at least 30 points across the activity area is made. The sample “point” is a six-inch diameter circular area around the sample point. Four visual disturbance classes were identified, using forest floor impacts, evidence of past equipment use, surface displacement, depth of ruts, depth of compaction, depth of platy structure, and severity of burn (See table below). A determination is then made of how the results from the visual attributes or soil disturbance classes relate to “detrimental” disturbance as defined in FSM 2500. The portion of the activity area with “detrimental” disturbance can then be calculated.

Categories of soil impact, with increase in severity of impact from class 0 (undisturbed) to class 3 (severely disturbed).

Soil Disturbance Class 0 – Undisturbed	**Soil Disturbance Class 1**
Soil surface: No evidence of past equipment operation. No depressions or wheel tracks evident. Forest floor layers present and intact. No soil displacement evident. No management-generated soil erosion. Litter and duff layers not burned. No soil char. Water repellency may be present.	Soil surface: Faint wheel tracks or slight depressions evident and are <5 cm deep. Forest floor layers present and intact. Surface soil has not been displaced and shows minimal mixing with subsoil. Burning light: Depth of char < 1 cm. Accessory: Litter charred, or consumed. Duff largely intact. Water repellency is similar to pre-burn conditions. Soil compaction: Compaction in the surface soil is slightly greater than observed under natural conditions. Concentrated from 0-10 cm in depth. Observations of soil physical conditions: Change in soil structure from crumb or granular structure to massive or platy structure, restricted to the surface 0-10 cm. Platy structure is non-continuous. Fine, medium, and large roots can penetrate or grow around the platy structure. No “J” rooting is observed. Erosion is slight

Soil Disturbance Class 2	Soil Disturbance Class 3
Soil surface: Wheel tracks or depressions are 5 to 10 cm deep. Accessory: Forest floor layers partially intact or missing. Surface soil partially intact and may be mixed with subsoil. Burning moderate: Depth of char 1- 5 cm. Accessory: Duff deeply charred or consumed. Surface-soil water repellency increased compared to the pre-burn condition. Soil compaction: Increased compaction is present from 10-30 cm in depth. Observation of soil physical condition: Change in soil structure from crumb or granular structure to massive or platy structure, restricted to the surface 10-30 cm. Platy structure is generally continuous Accessory: Large roots may penetrate the platy structure, but fine and medium roots may not. Erosion is moderate	Soil surface: Wheel tracks and depressions highly evident with depth >10 cm. Accessory: Forest floor layers are missing. Evidence of surface soil removal, gouging, and piling. The majority of surface soil has been displaced. Surface soil may be mixed with subsoil. Subsoil partially or totally exposed. Burning High: Depth of char > 5 cm. Accessory: Duff and litter layer completely consumed. Surface soil is water repellent. Surface reddish or orange in places. Soil compaction: Increased compaction is deep in the soil profile (> 30 cm in depth). Observations of soil physical conditions Change in soil structure from granular structure to massive or platy structure extends beyond 30 cm in depth. Platy structure is continuous. Accessory: Roots do not penetrate the platy structure. Erosion is severe and has produced deep gullies or rills.

23. Comment: It is hard to determine the difference between the two action alternatives with regard to detrimental soil disturbance. Appendix E doesn't distinguish between the two except to note that certain units would have temporary roads. What are the differences between the two? (FOC)

> **Response:** Regarding detrimental soil disturbance (DSD), the difference between the two alternatives is that Alternative 2, compared to Alternative 3, has higher overall DSD due to temporary road construction (Units 1, 3, 6, 7, 16 and 27) and two more units that require specific design measures that set limits on the extent of new DSD to remain below the 15% DSD standard (revised DEIS pages 66 and 67). Related specifically to the 15% DSD standard, the cumulative DSD for all units under each alternative would be less than 15%, following harvest activities and temporary road construction.

Vegetation

24. Comment: We have some concern with the intensity of regeneration logging proposed for the purpose of white pine restoration. We encourage you to evaluate some of the research from Terrie Jain at the RMRS in Moscow who has found that smaller openings can meet the goal of reestablishing white pine. You should evaluate the potential of incorporating some of proposed units to evaluate the effectiveness of different size openings for white pine restoration. (ICL)

> **Response:** Theresa Jain, et al (2004) found that "Growth will be sacrificed when western white pines occur in openings of less than 4-5 hectares, but the species can persist in smaller openings." While this is true, openings of this size would not meet the other purpose of this project, which is to restore white pine and larch to more historic amounts of these forest cover types across the landscape. Since the white pine cover type in particular is so underrepresented compared to

historic levels, smaller openings would not meet this goal as effectively as the openings currently proposed, because smaller openings treat smaller areas and therefore less of the landscape is restored.

25. Comment: We encourage you to retain trees in a non-uniform spacing to promote within-stand diversity in both the white pine restoration, as well as the commercial thinning units. By varying the spacing and retaining clumps of trees, wildlife habitat, ecological function and microclimatic variables can be improved. (ICL)

Response: In units proposed for regeneration harvest, seed tree harvest and shelterwood harvest would be used as well as variable tree retention. Seed tree and shelterwood harvests would favor white pine and western larch for retention, and trees would be left where they naturally occur on the landscape. Variable tree retention would also be implemented in the units proposed for regeneration harvest. This is expected to result in a non-uniform pattern throughout the units.

In units proposed for commercial thinning, prescriptions would allow flexibility to leave trees in varying densities, but retaining an average density throughout the unit (refer to revised DEIS, p. 18). Units would likely be marked to retain an average basal area, which would cause more trees to be retained where the trees are smaller and fewer trees to be retained where the trees are larger.

26. Comment: We encourage you to maintain some co-dominant, suppressed trees that can often develop into more suitable wildlife trees. We recognize that the purpose of the project is to promote growth; however, maintaining diversity within the stands is key towards meeting other standards and guidelines consistent with the Forest Plan. (ICL)

Response: It is highly likely that co-dominant and intermediate trees would be retained in units proposed for commercial thinning. Suppressed trees would be retained where needed to achieve desired stocking levels.

27. Comment: The DEIS notes that no old growth or older forests (over 130 years old) would be logged. Will any be thinned? Also, were any of those areas logged in the past? If so, why do they meet old growth characteristics? (FOC)

Response: No timber harvest, including thinning, would occur in these areas. Areas designated as old growth or older forests have generally not been logged in the past. Any logging that may have occurred in the past was minimal salvage logging and did not change the overall stand characteristics.

28. Comment: Given blister rust, it is laughable to suggest white pines are healthier than species currently occupying the area. The trees that grow there now, by any measure of biological understanding, are most adapted to the area. (FOC)

Response: Harvey et al 2008, states: “A strong tendency to be tolerant of endemic insects and pathogens is a characteristic generally typical of seral species in white pine country. This is particularly true of WWP [western white pine]. The species is usually quite tolerant of the myriad of foliar insects and root-rotting pathogens typical of the region.” This same article also states that “Native insects and pathogens are powerful background forces in WWP-dominated ecosystems. They tend to remove the late seral and climax species, such as Douglas-fir, grand fir, and western hemlock, from stands as they age.”

Hagle 2010, states that with the prevalence of root disease in this project area, particularly Armillaria, recommended management is to replace root disease susceptible species (grand fir, Douglas-fir) with less susceptible species (larch and white pine). Western white pine regeneration would be performed by planting blister rust resistant stock.

29. Comment: Research shows logging increases rather than decreases disease in trees. However, this project is supposedly justified on decreasing disease through logging. (FOC)

Response: Aho et al support this claim in their paper entitled "Decay Fungi and Wounding in Advance Grand and White Fir Regeneration" (1987). This research paper is consistent with other research on incipient decay in grand fir often caused by wounding, and is consistent with why we are not proposing to manage for or release grand fir.

30. Comment: The assertion that white pines are ecologically more resilient than other species is ridiculous. Yet, the DEIS claims that it is making the area more resilient by planting white pines and increasing age diversity. (FOC)

Response: The Dictionary of Forestry (1998) defines resilience as "the capacity of a (plant) community or ecosystem to maintain or regain normal function and development following disturbance". Neuenschwander and others (1999) assert "western white pine regenerates well after wildfire, logging, or land clearing. Fire is so good for the species that 50 years after a fire, its forests are dense again with thousands of trees per acre." With this information in mind, it is reasonable and accurate to state that white pine is resilient to disturbance.

According to Neuenschwander and others (1999) "the western white pine forests of the Pacific Northwest are today occupied by less stable, diverse, resilient, and productive species than they were a century ago." The authors are referring to the shift that has occurred from white pine dominated forests to more shade tolerant dominated forests. This statement substantiates that western white pine forests are more resilient than the species that have supplanted them.

The purpose of this project is not to eradicate shade tolerant species from the landscape; the purpose is to increase species diversity at the stand and landscape levels by increasing amounts of early seral tree species. According to Tappeiner and others (2007), "Growing mixed-species stands and avoiding dense stands on dry sites are important ways to provide some resistance to pathogens and insects and to preserve options for forest stands when outbreaks occur." This statement reflects what is discussed in the revised DEIS: that increasing species diversity on the landscape and at the stand level increases resilience.

In the revised DEIS (p. 4), balancing vegetative successional stages is listed as one of the ways in which resilient conditions would be created. Raffa and others (2008) support this idea: "Homogeneous species, age, and genetic structures are more likely than more heterogeneous conditions to provide the sudden input of available hosts needed to surpass the eruptive threshold following an exogenous stress." In other words, increasing species and age class diversity increases a system's resistance to disturbance, thus making it more resilient.

Literature Cited

Neuenschwander, L.F., J.W. Byler, A.E. Harvey, G.I. McDonald, D.S. Ortiz, H.L. Osborne, G.C. Snyder, A. Zack. 1999. White pine in the American West: a vanishing species- can we save it? USDA Forest Service, General Technical Report RMRS-GTR-35. 20p.

Raffa, K.F., B.H. Aukema, B.J. Bentz, A.L. Carroll, J.A. Hicke, M.G. Turner, and W.H. Romme. 2008. Cross-scale drivers of natural disturbances prone to anthropogenic amplification: the dynamics of bark beetle eruptions. Bioscience 58: 501-517

Tappeiner, J.C., D.A. Maguire, T.B. Harrington. 2007. Silviculture and Ecology of Western U.S. Forests. Oregon State University Press, Corvallis, OR. 440 pp.

31. Comment: The DEIS fails to adequately analyze the fact that just adjacent to the project area (to the west) are a few hundred thousand forested acres in the young habitat type. Thus, there is no need to create this supposed age diversity on the landscape scale. In any case, the types most rare are the older forest types. (FOC)

Response: Actually, the forested acres on private lands to the west are advancing into mid-seral age classes. A purpose of this analysis is to start the trend to balance vegetative successional stages within the Lower Orogrande analysis area, which consists entirely of National Forest lands. Also, per the Forest Plan, we manage old growth habitat by old growth analysis units, which in the case of Lower Orogrande are all meeting Forest Plan standards (refer to revised DEIS, pgs. 15 & 16 and Appendix D).

Water/Fish

32. Comment: Since the Responsible Official must obtain a NPDES permit from EPA before any activity may commence on this timber sale, the Decision Document must state that the permit will be obtained immediately after the decision document has been signed. (DA)

Response: Section 402 of the Clean Water Act that discusses the need for a NPDES permit is referenced on page 8 of the revised DEIS. On December 12, 2012, the EPA revised the stormwater regulations to clarify that an NPDES permit is not required for stormwater discharges from logging roads (40 CFR Part 122; Fed. Reg. Vol. 77, No. 236). NPDES permits for the Lower Orogrande Project are not required at this time.

Although the Forest Service is not bound by the NPDES permitting requirements, the Lower Orogrande project still has to meet other water quality requirements of the Clean Water Act, the State of Idaho, and the Forest Plan. An effects analysis was completed for watershed (DEIS, pages 68 through 76), and consistency with these requirements was discussed (DEIS, pages 8 and 9, and page 76).

33. Comment: The watershed improvements (road decommissioning and road closures) are the same between Alternative 2 and 3. The planning team should have presented differences in the watershed improvements within the range of alternatives. (IDPR)

Response: No issues were identified during the analysis that required a difference between the action alternatives in regards to watershed improvements.

34. Comment: How can the DEIS claim that Appendix K in the forest plan is being met when there is “no data” on one watershed (page 43)? (FOC)

Response: There is no reference to “no data” on page 43 of the revised DEIS. Table 3.2 states that the existing condition for Lower Orogrande Creek was “not modeled”. Appendix K relies on either actual survey data or modeled data. Orogrande Creek below French Creek meets the desired condition for cobble embeddedness based on actual habitat surveys conducted on the creek (revised DEIS, pgs. 43, 44).

35. Comment: The DEIS states that, "Any sediment yield increases would be short-term (0-5) years, and beneficial uses in Orogrande Creek and its tributaries would be maintained." There are two concerns with this statement. First, it suggests that sediment could increase, a violation of the settlement agreement and the forest plan standards. Second, it conflates the beneficial uses under state water law with the much stricter forest plan standards. (FOC)

Response: The short term sediment estimate is based on the WEPP model that predicts a very low (less than 10%) probability of sediment delivery to streams (revised DEIS, p-71). BMP monitoring across the Forest has shown no sediment delivered to streams from harvest operations due to the implementation of design features (revised DEIS, pg.24, 71). There is no violation of the settlement agreement or Forest Plan standards due to the low probability of delivery when combined with monitoring and professional judgment. The project meets Forest Plan standards as well as maintains beneficial uses (revised DEIS, pgs. 71, 75, 76, 81). The only direct sediment entering streams are associated with road decommissioning and culvert replacement activities (revised DEIS pgs. 72, 74, 78).

36. Comment: The DEIS suggests that there is sufficient vegetation for shading. Orogrande Creek, particularly on the side opposite the road, is devoid of trees due to past logging in the RHCAs. However, the DEIS makes inconsistent statements on whether the riparian vegetation is currently sufficient to meet habitat and water quality standards. (FOC)

Response: As noted in the revised DEIS, p-45, the mainstem of Lower Orogrande Creek will not achieve its TMDL shading target due to its large width combined with 1.5 miles of meadow habitat and the presence of 6.5 miles of Forest Road 250. The vegetation in Lower Orogrande tributaries are well shaded and continue to grow, allowing standards to be met over time. Project activities would not affect riparian shading, except where trees are removed during road decommissioning activities (revised DEIS, pgs. 78-81). The removal of these roads would allow for improved and long-term shading over time.

37. Comment: The DEIS discussion of regeneration logging mentions the RHCAs (page 17). Will there be logging in the RHCAs as well? (FOC)

Response: RHCAs are mentioned as areas where leave trees would be retained. No commercial harvest is proposed in RHCAs (revised DEIS, pgs. 24, 78).

38. Comment: This DEIS suggests there is little or no bull trout use in the area. However, the entire main stem of Orogrande Creek is LISTED as critical habitat. How does the DEIS comply with ESA given that fact and the fact that all restoration work may not occur? (FOC)

Response: As noted in the revised DEIS, p-45, bull trout use is limited in the drainage because of a natural falls near the mouth of Lower Orogrande Creek. The USFWS has the responsibility for designating critical habitat throughout the range of bull trout. The North Fork Clearwater River has a strong population of bull trout, and since the Lower Orogrande Falls was not a complete barrier to upstream migration, the stream was listed. The project complies with ESA in that it does not adversely affect bull trout or designated critical habitat due to the retention of INFISH buffers, road decommissioning, culvert replacement, and road reconstruction activities. It would have beneficial effects to bull trout as a result of the variety of proposed road work. The USFWS concurred that the project is in compliance with ESA (Letter of Concurrence, Dec. 14, 2011). The Clearwater National Forest has an excellent record of conducting culvert replacements and road decommissioning (CNF Annual Monitoring Reports, 2009). The Forest, and its Watershed Restoration Coordinator, maintains an emphasis on these types of activities and will continue to do so into the future.

39. Comment: What monitoring data, including recent data, prove an upward trend in water quality since the forest plan was approved? The water quality/fisheries data in the DEIS appear to be 14 years old. (FOC)

Response: The Forest Plan does not require an "upward trend" for aquatic habitats but instead seeks to meet certain desired conditions. The use of older data is acceptable especially when combined with field reviews (revised DEIS pgs. 77, 79) and the fact that very little timber harvest has occurred in the area since the data was collected. No landslides or other events have occurred since that time that would increase sediment to streams. In addition, 34 miles of road decommissioning and continued vegetation growth has occurred since the data was collected. This has allowed for increases in shading, overhead cover, and large woody debris as well as reduced sediment input from roads during that time. Field reviews combined with professional judgment indicate that streams are stable or are experiencing improving conditions.

40. Comment: Is the existing condition (page 43) actually the existing condition or a modeled condition? How can data that is at least fifteen years old be considered current? (FOC)

Response: The existing sediment yield information presented on page 43 was modeled in WATBAL in 1997 (pg. 42). The only exception is the information for Orogrande Creek below French Creek which is based on actual stream survey data (pg. 43, 44). The effects analysis for sediment yield was modeled using WEPP (pg.71) and is based on current slope length, gradient, soils, precipitation, and stream buffer width. Watershed conditions are expected to be in a better condition now than in 1997 due to a lack of activities since the model was run therefore older data was considered usable. Field surveys of streams were also conducted during project development in order to assess stream conditions (revised DEIS, pgs. 69, 77).

41. Comment: When was the actual monitoring on cobble-embeddedness done and what are the results? In other words, what monitoring data, including recent data, prove a positive trend in water quality since the forest plan was approved? (FOC)

Response: The Forest Plan does not require a positive trend for aquatic habitats but instead seeks to meet certain desired conditions. Cobble embeddedness data was collected in 1997 and presented in the Fisheries section of the Revised DEIS (pg. 44). Levels for the mainstem of Orogrande were 22-28% which is well below the 35% Forest Plan desired condition. All other tributaries exceeded the desired conditions. *See Comment 39 above for more information on potential trends in water quality.*

42. Comment: The DEIS suggests watershed improvement from restoration activities. However, there is no guarantee those activities would all occur (see pages 110 and 111). Are water quality assessments in the DEIS based upon the assumption that the stated improvements under the various alternatives would actually occur? (FOC)

Response: The revised DEIS suggests that harvest activities may not be able to pay for all the proposed aquatic restoration work; however the Clearwater National Forest has an excellent record of completing culvert replacements and road decommissioning activities through appropriated funds and partnership programs (CNF Annual Monitoring Reports, 2009). The Forest, and its Watershed Restoration Coordinator, continues to maintain an emphasis on these types of activities and will continue to do so into the future. The water quality assessments (potential sediment yield, are based on sediment modeling using WEPP. This model does not account for road decommissioning or culvert replacement activities (revised DEIS, pgs. 68). The analyses associated with these activities are qualitative (revised DEIS, pgs. 72, 78, 79) and based on science and professional experience. Road reconstruction activities on routes used for timber haul would be required as part of the timber sale (Map Alternative 2, Vegetation Treatments, Chapter 2 revised DEIS). These activities are not optional and occur in many of the same locations as the watershed restoration activities (Map Alternative 2, Watershed and Wildlife Activities, Chapter 2).

43. Comment: Why does the DEIS claim road decommissioning will lead to reforestation when future timber sales may use those areas for roads? Isn't the analysis on page 73 misleading in this regard? (FOC)

Response: A roads analysis was conducted for the project area which identified roads needed for future management. The remaining roads were proposed for decommissioning. The analysis on page 43 is tied to the 40 acre opening assessment. If we restrict Units 1, 2, and 16 to 40 acre or less openings, then 2 miles of road proposed for decommissioning would not occur. If we utilize the proposed harvest of over 40 acres, then those roads could be decommissioned. No future use is expected on roads that are decommissioned.

44. Comment: The DEIS is not clear on cumulative impact to water quality and fisheries, especially when taking into account adjacent land. Some of the analysis only includes road densities from the national forest land. However, the cumulative impact on watersheds (and wildlife) should consider all the acreage within a given watershed. Why has this been inconsistently analyzed? Also, adjacent lands don't have the requirement for RHCAs to protect bull trout. (FOC)

Response: As stated in the revised DEIS, the cumulative effects analysis for Watershed and Fisheries is provided in the revised DEIS, pages 74, 75, 79, 80). They do not include a quantitative assessment for private lands, except for ECA, but do complete a qualitative assessment. They explain why and how private lands were or were not considered and why there would be no cumulative effects based on existing conditions and project design. While private lands may not have INFISH RHCAs, they are required to follow Idaho Forest Practices Act BMPs in order to minimize effects to streams (revised DEIS, pg. 80). There is no designated critical habitat for bull trout on private/state lands.

45. Comment: Regarding RHCAs, the DEIS would allow precommercial thinning in these areas. Are there plans to commercially thin then log in RHCAs? If not, why do precommercial thinning? (FOC)

Response: Precommercial thinning is a silvicultural term that we use to describe thinning of trees that are of small, non-merchantable size. Thinning allows us to select for preferred species that will stay on the landscape over the long term, including trees within RHCAs. It reduces competition for light, nutrients, and water and provides for a healthy stand of trees. The agency has no plans for commercially thinning or logging in RHCAs at this time or in the foreseeable future.

Wildlife

46. Comment: The DEIS claims no impact to kingfisher, Coeur d'Alene salamander, and harlequin duck. However, the action alternatives "treat" within ten feet of streams. How can a no effect determination be made? (FOC)

Response: The only treatment within the buffers is precommercial thinning and the "no treatment area" has been expanded to 25' based on public comment. Proposed activities would avoid potentially suitable habitats for the three species (revised DEIS, p-48). Coeur d'Alene salamanders prefer spring seeps, waterfall spray zones and banks of small cascading streams (Project File, Wildlife supporting document). Only three of the units proposed for thinning occur near streams of this type. Retained trees within units and untreated areas outside of them will continue to provide cover habitat for the salamander. Harlequin ducks prefer large rivers with gradients less than 3%, such as the mainstem of Orogrande Creek. Young plantations suitable for precommercial thinning do not provide habitat for harlequins. Kingfishers perch on any available vegetation generally very close to the stream and construct burrows for nesting. They also prefer larger streams. Four of the precommercial thinning areas are near streams larger enough for kingfisher use. Adequate vegetation would be retained in untreated and treated areas to provide perching habitat for kingfisher.

47. Comment: The DEIS claims no effect to goshawk, pileated woodpeckers, and marten because they use old growth forests and none would be logged. Past documents from the Clearwater National Forest offices have claimed that additional habitat outside of old growth exists for those species. Why the sudden change? (FOC)

Response: Analyzing each of these species in detail is the main difference between the revised DEIS and the original DEIS (refer to the revised DEIS, pgs. 50-52 and 84-94). Although some habitat outside of old growth for each species would be affected by proposed treatments, the overall conclusion is that there would be no cumulative effects associated with the Lower Orogrande project that would jeopardize species populations or alter current population trends.

48. Comment: With regard to the boreal toad, how can the project affect its habitat when it supposedly resides in RHCAs? Furthermore, would the activity associated with precommercial thinning in RHCAs affect even more habitat? (FOC)

Response: Boreal toads utilize stream habitats during the breeding season but are known to travel away from them into upland habitats outside of that season (revised DEIS, p-54). Precommercial thinning is not likely to affect toads since they prefer to hide under logs. Thinning would remove standing trees and would not displace or remove existing downed logs. In many of the units, down wood is likely lacking due to previous harvest. In addition, any risk to the species is considered very low due to the lack of sightings in the project area (revised DEIS, p-54).

49. Comment: The DEIS admits to a loss of quality summer habitat for elk for all action alternatives. Since the area consists of MA E1 and MA C4 (wildlife winter range?), the agency apparently does not consider that a problem. (FOC)

Response: As noted in the revised DEIS, p-82, elk habitat effectiveness would be reduced by 1% to 47%. This is almost double the minimum Forest Plan requirement of 25%. Activities would increase forage by 5% and security to 15%, both of which are beneficial to elk. We do not consider this a problem, as the benefits outweigh the slight reduction of habitat effectiveness, which still exceeds Forest Plan requirements.

50. Comment: There are riparian areas (MA M2) included in the project area. The DEIS admits it will thin in those areas, yet there is no apparent analysis of the impact to elk habitat. What would the impact be on elk and moose from that riparian thinning? (FOC)

Response: The areas proposed for precommercial thinning provide only very limited forage as well as cover opportunities. Effects to elk and moose from thinning are expected to be minimal mostly due to the widespread and small size of the units. Negative effects could include slightly less cover in the units and some difficulty in traveling through the units due to slash. This would last roughly two years. There may be slight increases in forage opportunities as the ground cover (grasses, forbs) grow with increased light.

51. Comment: The DEIS omits any analysis of lynx, stating the area is not within an LAU. However, the Clearwater is considered occupied habitat and the area does have habitat for lynx. Furthermore, it is mapped as lynx habitat according to the Idaho Department of Fish and Game. (FOC)

Response: An updated lynx analysis has been included in this FEIS and in the Biological Assessment, which will be attached to the Record of Decision. The analysis determined that the Lower Orogrande project "may affect, but is not likely to adversely affect" the Canada lynx and/or its habitat.

52. Comment: It appears that both old growth and mature stands would be logged, when comparing the map in appendix D and the preferred alternative. Could you please provide a map showing both old growth and mature forests overlayed with the proposed units? Could you also please clarify whether any mature forest or old growth would be logged? (FOC)

Response: As stated on page 15 of the revised DEIS, "no stands of old growth (150+ years old) of stands that qualify as step down (130+ years old) are proposed for treatment." The map requested has been attached to the Errata section of this document.

Misc. Comments

53. Comment: The maps included in the Revised DEIS appear inconsistent with the acreage reductions identified in Alternative 3. For instance, in each of the unit areas accessed by a temporary road in Alternative 2, the same units are displayed in association with Alternative 3. (ICL)

Response: A corrected map for Alternative 3 has been included in Chapter 2 of this document.

54. Comment: The following quote from the [USDA - *Survey Results of the American Public's Values, Objectives, Beliefs, and Attitudes Regarding Forests and Grasslands*] proves that the Proposed Action in the Lower Orogrande revised DEIS is the antithesis of what the American public want done to their precious national forest land: "The public sees the restriction of mineral development and of timber harvest and grazing as being more important than the provision of natural resources to dependent communities (although this is still seen as somewhat important)." (DA)

Response: The above mentioned survey of approximately 7,000 randomly selected members of the American public was documented in a 121-page technical report used to support the 2000 USDA Forest Service RPA Assessment or Strategic Plan. This Plan is updated every five years and provides the strategic direction that guides the Forest Service in delivering its mission, which is to "sustain the health, diversity, and productivity of the Nation's forests and grasslands to meet the needs of present and future generations".

The quote referenced in the comment can be found in the Economic Development subsection of the technical report and actually contradicts the opinion the commenter is trying to present for the following reasons:

a. Using the survey's scale of 1=not at all important to 5=very important, the objective of providing natural resources to dependent communities scored a 3.60, compared to a 3.99 for restricting timber harvest and grazing. Thus, as stated in the quote, the objective of providing natural resources to dependent communities was still considered somewhat important.

b. The survey also stated that "the provision of resources is also a somewhat important role for the USDA Forest Service."

The current USDA Forest Service Strategic Plan for fiscal years 2007-2012 highlights the need for forest and grassland restoration to help reestablish structural characteristics, native species, and ecological processes. It also contains Objective 2.1, which is to "provide a reliable supply of forest products over time that (1) is consistent with achieving desired conditions on NFS lands and (2) helps maintain or create processing capacity and infrastructure in local communities." The Lower Orogrande project is clearly in line with the Strategic Plan and its objectives (refer to revised DEIS, pages 2 through 4).

55. Comment: We encourage the Forest Service to develop a detailed monitoring plan that includes a discussion of how monitoring results would inform the implementation of forest activities and the potential need to modify these in order to further the project's goals. (EPA)

Response: The Clearwater Forest has been conducting BMP audits for timber harvest and road related activities as well as monitoring on the effectiveness of road decommissioning and culvert replacements (CNF Annual Monitoring Reports, various years). Past monitoring has led to improvements in implementation in all activities (Annual Monitoring Report, 2009). Long-term monitoring continues for road decommissioning projects and BMP audits are conducted annually on selected timber sales. Due to limited funding and personnel, monitoring cannot be conducted on every project across the Forest. Monitoring in other portions of the North Fork Clearwater drainage on similar landtypes to Lower Orogrande has been conducted. These areas are representative of conditions in the project area. Results of monitoring there and elsewhere on the Forest were, and will continue to be, used to make adjustments to proposed activities.

56. Comment: We understand that the Clearwater/Nez Perce Forest Plan is currently being revised through the collaborative forest process. We recommend that the Forest Service consider issues identified through this process that may pertain to the project area directly or cumulatively. (EPA)

Response: Collaboration with the public occurs early in project planning, leading up to the purpose and need and proposed action. One of the primary collaborative groups associated with both Forests is the Clearwater Basin Collaborative (CBC). Coordination with CBC for the Lower Orogrande project began in January of 2010 and has continued throughout the project analysis.

E. Consideration of Other Science/Literature Submitted by the Public

Members of the Lower Orogrande interdisciplinary team are considered proficient in their field of study by way of academic achievement, agency training, years of professional experience, and in some cases, certification programs. As required under 40 CFR 1502.9(b), 1502.22, and 1502.24, team specialists identified methods used, referenced scientific sources relied on, discussed responsible opposing views, and disclosed incomplete or unavailable information. The opposing views contained in the comment letters were evaluated for applicability to this project proposal, with the findings discussed below:

Science/literature submitted by Friends of the Clearwater	***How Considered?***	***Rationale/Comments***
Baker, William, **Fire Ecology in Rocky Mountain Landscapes.**	Not applicable.	The book referenced supports landscape burning , which is not the purpose of Lower Orogrande.
EPA, 1999. Considering Ecological Processes In Environmental Impact Assessments.	Applicable	Standard guidance used in all NEPA analyses, including Lower Orogrande
Sauder, 2014. **Landscape Ecology Of Fishers (*Pekania Pennanti*) in North-Central Idaho**	Not used	Habitat model discussed is not suitable for project analyses.
Sauder et al., 2014. **Both Forest Composition And Configuration Influence Landscape-Scale Habitat Selection By Fishers (Pekania Pennanti) In Mixed Coniferous Forests of the Northern Rocky Mountains**	Not used	Supports Sauder's 2014 research paper..
Sauder et al.,, 2014. **Modeling the Effects of Dispersal and Patch Size On Predicted Fisher (Pekania [Martes] Pennanti) Distribution in The U.S. Rocky Mountains**	Not used	Supports Sauder's 2014 research paper..
Sauder et al., 2013. **Stand- and Landscape-Scale Selection of Large Trees by Fishers in the Rocky Mountains of Montana and Idaho**	Not used	Supports Sauder's 2014 research paper..
Attachment #1 submitted by Dick Artley	***How Considered?***	***Rationale/Comments***
Al-jabber, Jabber M. 2003 **Habitat Fragmentation: Effects and Implications**	Not used; Supports analysis	The document discusses fragmentation, which supports the project's goal to retain large patches of ground in the project area.
Anderson, P.G. 1996. **"Sediment generation from forestry operations and associated effects on aquatic ecosystems"**	Not used; supports analysis	Consistent with other science used to develop design features to minimize sediment. This article discusses the effects of logging and roads on aquatic habitats, particularly in relation to sediment delivery to streams. The article recommends measures to limit effects. These are similar to those used for the project including INFISH buffers, the decommissioning of unnecessary roads, and using appropriate yarding systems to minimize soil disturbance.
Applying Ecological Principles to Management of the U.S. National Forests	This document is applicable and consistent with literature used in the analysis	This article identified major ecological considerations that should be incorporated in sound forest management policy and their potential impacts on current practice. The project would maintain structural diversity by retaining coarse down woody debris.
Barry, Glen, Ph.D. **Commercial Logging Caused Wildfires.**	Not applicable.	This is an opinion piece that denounces all commercial timber harvest on FS lands.
Barry, John Byrne. **Stop the Logging, Start the Restoration**.	Not applicable	This is an opinion piece advocating an end to commercial logging on federal lands.
Cushman, John H. Jr. 1999. **Audit Faults Forest Service on Logging Damage in U.S. Forests.**	Not Applicable	This 1999 article in the New York Times reported deficiencies in implementation of Forest Service timber sales between 1995 and 1998. It is not pertinent to this project.
Dombeck, Mike Ph.D. **Through the Woods.**	Not used; supports analysis	This quotation is taken out of context and does not address any specific activities in the proposed project

Attachment #1 submitted by Dick Artley	***How Considered?***	***Rationale/Comments***
Dombeck, Mike Ph.D. 1998. A message on **Conservation Leadership** sent to all USFS employees on July 1, 1998	Not used; supports analysis	The Lower Orogrande project was developed with consideration of resource values, Forest plan goals, objectives and standards and in compliance with NEPA regulations.
Ehrlich, Anne Ph.D., David Foster Ph.D. and Peter Raven Ph.D. 2002. **Call to End Logging Based on Conservation Biology**.	Not applicable	The excerpted quote refers to environmental damage caused by Forest Service logging activities in the past century. It calls for a halt to commercial logging on National Forest Lands.
FOREST CONSERVATION NEWS TODAY. August 27, 2002. **Bush Fire Policy: Clearing Forests So They Do Not burn**	Not applicable	This is an opinion piece, not a scientific document.
Franklin, Jerry Ph.D., et. al. 2000. **Simplified Forest Management to Achieve Watershed and Forest Health: A Critique.**	Provides background information applicable and consistent to this project.	In this article, a multi-disciplinary group of scientists discuss ecosystem based management approaches to keep watersheds and forests functioning properly.
Franklin, Jerry F. Ph.D. and James K. Agee Ph.D. 2007. **Forging a Science-Based National Forest Fire Policy.**	Provides background information applicable to this project.	This paper is applicable and consistent with other literature used in the analysis.
Giuliano, Jackie Alan, Ph.D. 2008. **Fire Suppression Bush Style: Cut Down the Trees!**	Not applicable	This is an opinion piece, not a scientific document.
Government Accounting Office. 1999. **Western National Forests: A Cohesive Strategy is Needed to Address Catastrophic Wildfire Threats**.	Used for background information.	The Lower Orogrande project was developed to meet the purpose and need for action and to minimize impacts to resources. It is consistent with Forest Plan direction for this area and the 2007 Regional Integrated Restoration and Protection Strategy.
Gorte, Ross W. Ph.D. 1995. **Forest Service Timber Sale Practices and Procedures: Analysis of Alternative Systems**.	Not applicable	This report describes the Forest Service timber sale system and the major concerns over the consequences of the sale system. It then reviews the option of a complete overhaul of the current approach that would separate the timber cutting and removal from the sale of the wood, and analyzes the consequences of this approach. This is not applicable to analysis of the environmental effects of the proposed actions.
Hanson, Chad Ph.D. 2000. **Commercial Logging Doesn't Prevent Catastrophic Fires, It Causes Them**.	Not Applicable	This opinion piece is not a scientific document.
Hanson, Chad, Ph.D. 2001. **Logging for Dollars in National Forests**.	Not applicable	This is a single statement from an opinion piece
Hanson, Chad Ph.D. 2008. **Logging Industry Misleads on Climate and Forest Fires**.	Not applicable	This is a single statement taken from an opinion piece.
Harvey, A. E., M. J. Larsen, and M. F. Jurgensen. 1976. **Distribution of Ectomycorrhizae in a Mature Douglas-fir/larch Forest Soil in Western Montana.**	Used for background information	Numerous authors have reported reductions in mycorrhiza populations due to forest disturbance; however, the degree of reduction and its impact on forest regeneration varies widely and depends on many factors. Project activities and design features are consistent with science discussed.
Houston, Alan Ph.D. 1997. **Why Forestry is in Trouble with the Public.**	Not applicable	Opinion piece
H. R. 1494 text. April 4, 2001 http://www.agriculturelaw.com/legis/bills107/hr1494.htm	Not applicable	Quotation refers to a single sentence taken out of context.
Hudak, Mike Ph.D. 1999. **From Prairie Dogs to Oysters: How Biodiversity Sustains Us**.	Not applicable	Quotation refers to a single sentence taken out of context.
Huff, Mark H. Ph.D., et. al. 1995. **Historical and current forest landscapes in eastern Oregon and Washington. Part II: Linking vegetation characteristics to potential fire behavior and related smoke production**.	Used for background information	This study examined changes in vegetation structure and composition in 6 river basins in eastern Oregon and Washington from 35 to 50 years ago to the present and to project the effects of vegetation changes on potential fire behavior and smoke production.
Ingalsbee, Timothy Ph.D. 1997. **Logging for Firefighting: A Critical Analysis of the Quincy Library Group Fire Protection Plan.**	Not applicable	This paper is specific to the Quincy Library Group Fire Protection Plan.

Attachment #1 submitted by Dick Artley	*How Considered?*	*Rationale/Comments*
Ingalsbee, Timothy Ph.D. 2000. **Commercial Logging, for Wildfire Prevention: Facts Vs Fantasies.**	Not applicable	This is an opinion piece.
Ingalsbee, Timothy Ph.D. 2002. **Logging without Limits isn't a Solution to Wildfires**.	Not applicable	This is an opinion piece
Ingalsbee, Timothy Ph.D. 2002. **The wildland fires of 2002 illuminate fundamental questions about our relationship to fire**.	Not applicable	This is single statement taken from an opinion piece.
Ingalsbee, Timothy Ph.D. 2003. **Fanning the Flames! The U.S. Forest Service: A Fire-Dependent Bureaucracy.**	Not applicable	This is an opinion piece. This project would treat logging slash
Ingalsbee, Timothy Ph.D. 2005. **A Reporter's Guide to Wildland Fire.**	Not applicable	This opinion piece contends that logging will make the area more prone to high intensity and high severity wildfires. Project analysis has determined that fuel loading post harvest would decrease.
Jalkotzy, M.G., P.I. Ross, and M.D. Nasserden. 1997. **The Effects of Linear Developments on Wildlife: A Review of Selected Scientific Literature**.	Not used.	This report discusses the effects of linear developments on wildlife, particularly types of roads and linear developments created by the oil and pipeline industries in western Canada. This project would not construct any new permanent roads.
Keene, Roy. 2009. **Logging does not prevent wildfires**.	Not applicable	Opinion piece
Keene, Roy. 2011. **Restorative Logging? "More rarity than reality"**	Not applicable	Opinion piece
Keppeler, Elizabeth T. Robert R. Ziemer Ph.D., and Peter H. Cafferata. 1994. **Effects of Human-Induced Changes on Hydrologic Systems.**	Used as background information	This study addresses hillslope drainage processes by comparing pre- and postharvest pore pressure levels and soil moisture conditions on a steep hillslope within a zero order basin in coastal northwestern California. The Lower Orogrande project incorporates design measures, BMPs and riparian area protections as well as ground truthing by project hydrologists and soil scientists to assure there would be no effects to these resources.
Klein, Al. 2004. **Logging Effects on Amphibian Larvae Populations in Ottawa National Forest.**	Not used.	This project proposes road decommissioning, culvert replacement and removal and 10 acres of small diameter fuels treatments in RHCAs and INFISH buffers where amphibians may exist. The Project BE/BE has documented there would be minimal effects to any amphibians from project activities.
Laverty, Lyle, USDA Forest Service and Tim Hartzell U.S. Department of the Interior. 2000. **A Report to the President in Response to the Wildfires of 2000**.	Used as background information	This Project would treat post harvest slash.
Lawrence, Nathaniel, NRDC senior attorney. 2001. **Gridlock on the National Forests**.	Not applicable	This nonscientific paper discusses thinning for fire risk reduction and post-fire salvage logging. This project does not propose post-fire salvage, but rather proposes thinning to improve stand health.
Leitner, Brian. 2003. **Logging Companies are Responsible for the California Wildfires**.	Not applicable	This nonscientific paper discusses thinning for fire risk reduction.
Long, Richard D., U.S. Department of Agriculture Office of Inspector General. 2001. **Western Region Audit Report: Forest Service National Fire Plan Implementation.**	Not applicable	This report presents the results of the Inspector General's 2001review of the Forest Service's implementation of the National Fire Plan. This report has no bearing on this project.
Mann, Charles C. Ph.D. and Mark L. Plummer Ph.D. 1999. **Call for 'Sustainability' in Forests Sparks a Fire**.	Not applicable	The Lower Orogrande Project is consistent with Forest Plan direction for this area.
Maser, C. Ph.D. and J. M. Trappe Ph.D. 1984. **The Seen and Unseen World of the Fallen Tree.**	Not applicable	Designated logging systems are designed to minimize soil disturbance that would detrimentally affect both physical character and biological soil organisms. Site disturbance for preparation for planting of the kind current in 1984 is not necessary with proposed silvicultural prescriptions, harvest systems, and site preparation activity.
Maser, C. Ph.D., R. F. Tarrant, J. M. Trappe Ph.D., and J. F. Franklin Ph.D. 1988. **The Forest to the Sea: A Story of Fallen Trees.**	Not applicable	Levels of down material that would remain after logging have been specified and are consistent with current direction.
Moring, John R. Ph.D. 1975. **The Alsea Watershed Study: Effects of Logging on the Aquatic Resources of Three Headwater Streams of the Alsea River, Oregon – Part III**.	Not applicable	This citation refers to logging practices of 34 years ago. This project's design features including implementation of INFISH RHCAs would prevent these effects.

Attachment #1 submitted by Dick Artley	***How Considered?***	***Rationale/Comments***
Naeem, Shahid Ph.D., et. al. 1999. **Biodiversity and Ecosystem Functioning: Maintaining Natural Life Support Processes.**	Consistent with project proposal	Biodiversity is preserved in this project by following Forest Plan requirements.
Nappier, Sharon. **Lost in the Forest: How the Forest Service's Misdirection, Mismanagement, and Mischief Squanders Your Tax Dollars**.	Not applicable	This is an opinion piece, not science
Noble, Ian R. and Rodolfo Dirzo Ph.D. 1997. **Forests as Human-Dominated Ecosystems.**	Not applicable	The Forest Plan specifies management direction for various areas. This project is consistent with Forest plan management direction for this area
Northup, Jim. 1999. **Public Wants More Wilderness, Less Logging on Green Mountain NF**.	Not applicable	This is an opinion statement containing survey information – not science
Okoand Ilan Kayatsky, Dan. 2002. **Fight Fire with Logging?**	Not applicable	This is an opinion piece
Parfitt, Ben and Laurel Brewster. 2000. **Muddied Waters: The Case for Protecting Water Sources in B.C.**	Not applicable	This publication is specific to British Columbia
Peters, Robert L. Ph.D, Evan Frost, and Felice Pace. 1996. **Managing for Forest Ecosystem Health: A Reassessment of the „Forest Health Crisis**	Provides general background information	This publication notes that fire, insects and disease are the drivers of forest diversity, structure and function. This project proposes activities to move species composition and structure toward desired conditions.
Peterson, Mike,. 2003. Testimony to the Senate Agriculture, Nutrition, and Forestry Committee concerning the Healthy Forests Restoration Act, HR 1904. June 26 2003	Not applicable	This is not a HFRA project
Platt, Rutherford V. Ph.D., et. al. 2006. **Are Wildfire Mitigation and Restoration of Historic Forest Structure Compatible? A Spatial Modeling Assessment.**	Not Applicable	This study questions the validity of thinning as a means both to reduce the threat of wildfire and to restore historic forest structure. Commercial and precommercial thinning proposed under this project are aimed at increasing stand vigor and species diversity.
Powell, Douglas S. Ph.D, Joanne L. Faulkner, David R. Darr, Zhiliang Zhu Ph.D. and Douglas W. MacCleery. 1992. **Forest Resources of the United States.**	Not Applicable	This quotation is a single statement pulled out of context of the document. Forest Service direction requires that all stands where harvest is prescribed be classified as suitable for timber production
Quigley, Thomas M. Ph.D., Richard W. Haynes and Russell Graham Tech. editors. 1996. **Integrated Scientific Assessment for Ecosystem Management in the Interior Columbia Basin and Portions of the Klamath and Great Basins**.	General information	Within this GTR, a wide variety of ecosystems are referenced. In this broad context, especially, the above statement regarding human-induced fire regime changes (where these changes have occurred) captures the primary historical activities related to those now-apparent changes.
Raven, Peter, Ph.D., Jane Goodall, C.B.E., Ph.D., Edward O. Wilson, Ph. D. and over 600 other leading biologists, ecologists, foresters, and scientists from other forest specialties. From a 1998 letter to congress.	Not applicable	This 1998 letter to Congress is an opinion piece signed by advocates of the Act to Save America's Forests. The Lower Orogrande project does not enter any old growth habitat or roadless areas and does not propose clearcutting.
Raven, Peter, Ph.D., from his February 9, 2001 letter to Senator Jean Carnahan	Not applicable	This 1998 letter to Senator Jean Camahan is an opinion piece that discusses harvest of ancient forests; clearcutting; harvesting roadless areas; and logging in certain special forest areas . This project does not enter any old growth habitat or roadless areas and does not propose clearcutting. This letter states we need to …allow sustainable forest practices around these protected forests which is consistent with the proposed project.
Roberson, Emily B. Ph.D., Senior Policy Analyst, California Native Plant Society Excerpt from a letter to Chief Dale Bosworth and 5 members of congress	Not applicable	These statements are generalizations, which, although they may be valid in some settings, do not apply to Lower Orogrande because of project design features. Moreover, this is court testimony by a third party, which although it is the speakers considered opinion, it is not peer reviewed material.
Roelofs, Terry D. Ph.D. 2003. Testimony for the California State Water Board and Regional Water Quality Control Boards Regarding Waivers of Waste Discharge Requirements on Timber Harvest Plans. August 2003.	Not applicable	This paper discusses how logging and associated activities impact coastal watersheds in California inhabited by coho salmon. INFISH buffers, BMP implementation assures there would be no change in temperature or sedimentation from proposed activities.
Rudzitis, Gundars. 1999 **Amenities Increasingly Draw People to the Rural West.**	Not applicable	Quotation references opinion poll information. It is not a scientific document.

Attachment #1 submitted by Dick Artley	*How Considered?*	*Rationale/Comments*
Scott, Mark G. **Forest Clearing in the Gray's River Watershed 1905-1996.**	Not applicable	This reference does not apply to this project. It focuses on the effects clearcutting within a watershed, which is not proposed under this project.
Short, Brant, Ph.D. and Dayle C. Hardy-Short Ph.D. **Physicians of the Forest : A Rhetorical Critique of the Bush Healthy Forest Initiative**.	Not applicable	Opinion piece
Sierra Club. 2005. **Ending Commercial Logging on Public Lands**.	Not applicable	Opinion piece
Slaymaker, Olav Ph.D. **"Assessment of the Geomorphic Impacts of Forestry in British Columbia".**	Not used; supports analysis	Consistent with other science used to develop design features to minimize hydrology effects. The abstract cited speaks to effects on runoff, water yield, peak flows, sediment and wood transport and mass movement (landslides). The article suggests that following Forest Practice Act codes (in British Columbia) can significantly minimize these impacts. The Lower Orogrande project implements design features, such as INFISH buffers, that are more stringent than state Forest Practice Act codes. Clearwater National Forest BMP audits have verified the effectiveness of preventing or greatly limiting impacts to streams.
Stahl, Andy. 2003. **Reducing the Threat of Catastrophic Wildfire to Central Oregon Communities and the Surrounding Environment**.	Not applicable	This is not a HFRA project
Strickler, Karyn and Timothy G. Hermach. 2003. **Liar, Liar, Forests on Fire: Why Forest Management Exacerbates Loss of Lives and Property**.	Not applicable	This is an opinion piece opposing all timber harvest
Taxpayers for Common Sense. 2000. **From the Ashes: Reducing the Harmful Effects and Rising Costs of Western Wildfires**.	Not applicable	This is an opinion piece, not science
Thomas, Craig. 2007. **Living with risk: Homeowners face the responsibility and challenge of developing defenses against wildfires**.	Not applicable	The quoted statement is included in an opinion piece. The statement focuses on protecting homes from wildfire near Lake Tahoe and encourages residents to implement defensible space around their homes.
University of California; SNEP Science Team and Special Consultants 1996. **Sierra Nevada Ecosystem Project: Final Report to Congress Volume 1**, **Chapter 4 – Fire and Fuels.**	Not applicable	These findings of this report apply to the Sierra Nevada ecosystem, not this project.
USDA Forest Service. **Forest Management: A Historical Perspective.**	Not applicable	This document does not pertain to proposed activities in this project.
Vincent, James W. Ph.D., et.al. 1995. **Passive-Use Values of Public Forestlands: A Survey of the Literature.**	Not applicable	The Lower Orogrande project is consistent with Forest Plan Management area direction. The article contains survey information, not science.
Voss, René. 2002. **Getting Burned by Logging**.	Not applicable	This is an opinion piece; not a scientific document.
Wuerthner, George. 2008. **Logging, thinning would not curtail wildfires.**	Not Applicable.	This article contends that mechanical treatments can increase wildfires' spread and severity by increasing the fine fuels on the ground (slash) and by opening the forest to greater wind and solar penetration, drying fuels faster than in unlogged forests. This project proposes treatment of activity fuels following timber harvest.
Wuerthner, George. 2009. **Who Will Speak For the Forests?**	Not applicable	This is an opinion piece describing potential resource impacts from logging activities in general. The Lower Orogrande project contains design features to contain potential impacts.
Ziemer, Robert R. Ph.D., 1992. **Effect of logging on subsurface pipeflow and erosion: coastal northern California, USA.**	Not applicable	Article is specific to northern California
Attachment #4 submitted by Dick Artley	*How Considered?*	*Rationale/Comments*
Amaranthus, Mike P. Ph.D., Raymond M. Rice Ph.D., N. R. Barr and R. R. Ziemer Ph.D. 1985. **Logging and forest roads related to increased debris slides in southwestern Oregon.**	Not used; Supports analysis	This study came to the same conclusions as ones done on the Clearwater N.F. after 1996-1997 flood event. The project avoids landslide prone areas.

Attachment #1 submitted by Dick Artley	***How Considered?***	***Rationale/Comments***
Borga, M., F. Tonelli, G. Dalla Fontana and F. Cazorzi. 2003. **Evaluating the Effects of Forest Roads on Shallow Landsliding** .	Not used	The WEPP model was used for watershed analysis on this project.
Bowling, L.C., D. P. Lettenmaier, M. S. Wigmosta and W. A. Perkins. 1996. **Predicting the Effects of Forest Roads on Streamflow using a Distributed Hydrological Model.**	Not used	The WEPP model was used for watershed analysis on this project.
Brister, Daniel. 1998. **A Review and Comment on: *Forest Service Roads: A Synthesis of Scientific Information*, 2nd Draft, USDA Forest Service.**	Limited applicability	Comments on a Forest Service document focusing on disagreement with a number of statements. Too broad to apply to the road segments and land types in the project area. Since the points cited are from a large variety of articles in many areas, it is difficult to find applicability to the design measures and land types where roads exist or are proposed on this project.
Bunnell, Fred L. Ph.D., Kelly A. Squires and Isabelle Houde. 2004. **Evaluating effects of large-scale salvage logging for mountain pine beetle on terrestrial and aquatic vertebrates.**	Limited applicability	This pertains to beetle kill salvage logging in British Columbia. The Lower Orogrande project is not conducting salvage logging; however many of the design features are used in the project (tree retention, INFISH buffers)
Burns, James W. 1972. **Some Effects of Logging and Associated Road Construction on Northern California Streams.**	Not used	This study is based on road building practices of the 1960s. This project requires design features to eliminate the problems presented in this document.
Attachment #4 submitted by Dick Artley	***How Considered?***	***Rationale/Comments***
Buttenfield, Barbara P. Ph.D. and David R. Cameron. 2000. **Scale Effects and Attribute Resolution in Ecological Modeling.**	Not used; supports analysis	This document discusses GIS analysis using different scales. It touches on fragmentation of patches caused by roads and the influence of roads on landscape structure. The Lower Orogrande project assesses roads at the smaller project level, and larger cumulative effect level.
deMaynadier, Phillip G. and Malcolm L. Hunter, Jr. **Road Effects on Amphibian Movements in a Forested Landscape.**	Not used	Study conducted in Maine for wide roads with use of 300 vehicles/day.
Dombeck, Mike Ph.D. 1998. US Forest Service Chief Dombeck remarks made to Forest Service employees and retirees at the University of Montana. February 1998.	Not Used; supports analysis	Lower Orogrande is consistent with the road recommendations made by the Chief in this speech: no new permanent roads, eliminate unneeded roads and upgrade roads important to public access.
EPA. 2000. Entry into the Federal Register: March 3, 2000 (Volume 65, Number 43) Page 11675. **National Forest System Road Management.**	Not used supports analysis	CFR notice of comment opportunity on Forest Service Road Management. Proposed strategy would have forests analyze new and existing roads for need, decommission those not needed, improve those roads needed to limit effects to resources. Lower Orogrande is consistent in that it addresses all three topics.
Forman, Richard T. and Lauren E. Alexander. 1998. **Roads and their Major Ecological Effects.**	Not used; supports analysis	Document discusses road impacts to species at a national level including Britain and Australia.
Frey, David. 2010. **Logging Won't Halt Beetles, Fire, Report Says**.	Not applicable	The document is all about efficacy of management treatments in lodgepole pine forest during mountain pine beetle epidemics, which does not apply to the Lower Orogrande project.
Furniss, Michael J., Michael Love Ph.D. and Sam A. Flanagan. 1997. **Diversion Potential at Road-Stream Crossings.**	Not used; supports analysis	Document discusses impact of roads on the fishery. Project proposed action and design features minimize road impacts.
Gable, Eryn . 2010. **Battling beetles may not reduce fire risks – report.**	Not applicable	The document is all about efficacy of management treatments in lodgepole pine forest during mountain pine beetle epidemics, which does not apply to the Lower Orogrande project.
Grace, Johnny M. III Ph.D. 2003. **Minimizing the impacts of the forest road system.**	Not used	Study of mitigation measures to reduce sediment off roads in Georgia. Current BMP's including slash filter windrows have shown to be very effective on the Clearwater N.F.
Gucinski, Hermann Ph.D., Michael J. Furniss, Robert R. Ziemer Ph.D. and Martha H. Brookes, Editors. 2001. **Forest Roads: A Synthesis of Scientific Information.**	Not used	Discusses the connection of roads to community economic and resource impacts.

Attachment #4 submitted by Dick Artley	***How Considered?***	***Rationale/Comments***
Hann, W.J. et al. 1997. **Landscape dynamics of the Basin**.	Not Used; supports analysis	This assessment provides general background information on landscape dynamics within the Columbia Basin. The Lower Orogrande project addresses many of the issues mentioned here.
Haskell, David G. Ph.D. 1999**. Effects of Forest Roads on Macroinvertebrate Soil Fauna of the Southern Appalachian Mountains.**	Not used	The document discusses the macroinvertebrate soil fauna reduction near roads in the Appalachian Mountains. This project addresses the issue through road decommissioning activities.
Hawbaker, Todd J. Ph.D., et. al. **Road Development, Housing Growth, and Landscape Fragmentation In Northern Wisconsin: 1937–1999**.	Not used	Not applicable. This document pertains to road densities associated with housing development.
Ivins, Molly. 1997. Creators Syndicate, August 3 1997 08 03. http://www.creators.com/opinion/molly-ivins/molly-ivins-august-3-1997-08-03.html	Not used	Article suggests that N.F. roads are paid for by tax payers. Access to the timber stand via road construction is an appraised cost to determine stumpage. A business practice conducted by all land owners who sell timber.
Jones, Julia A. Ph.D., Frederick J. Swanson Ph.D., Beverley C. Wemple Ph.D., and Kai U. Snyder. 2000. **Effects of roads on hydrology, geomorphology, and disturbance patches in stream networks.**	Not used; supports analysis	This document supports the Lower Orogrande soil and water analysis recommendation to decommission excess roads and to reconstruct roads to minimize effects to streams.
Kahklen, Keith. 2001. **A Method for Measuring Sediment Production from Forest Roads.**	Not used	This paper discusses how and what equipment to use to conduct sediment monitoring for roads. The Lower Orogrande project does not propose to complete this type of monitoring. The WEPP model was used to model sediment production from roads on the this project.
Karr, James R. Ph.D., et. al. 2002. **Excerpt from a letter to the Subcommittee on Forests & Forest Health U.S. House of Representatives**.	Not applicable	This letter is a rebuttal to the Forest Service Chiefs testimony regarding the “Beschta report” which pertains to post fire salvage logging. Lower Orogrande is not a post fire salvage project.
Lawren, Bill. 1992. **Singing the Blues for Songbirds: Bird lovers lament as experts ponder the decline of dozens of forest species**.	Not applicable	Songbirds are not an issue with the Lower Orogrande project.
Lowe, Kimberly Ph.D. 2005. **Restoring Forest Roads.**	Not used; supports analysis	This paper pertains to restoring unused and abandoned roads. Lower Orogrande decommissions 89 miles of unneeded roads.
Luce, Charles H. Ph.D. 2002. **Hydrological processes and pathways affected by forest roads: what do we still need to learn?**	Not used, supports analysis	This document supports the watershed analysis for water and sediment yield. Lower Orogrande proposes road improvements to minimize effects to water and sediment yield to streams.
Maholland, Becky and Thomas F. Bullard Ph.D. 2005. **Sediment-Related Road Effects on Stream Channel Networks in an Eastern Sierra Nevada Watershed.**	Not used, supports analysis	This document supports the watershed analysis for water and sediment yield and the soil analysis for landslide assessment.
Malecki, Ron W. 2006. **A New Way to Look at Forest Roads: the Road Hydrologic Impact Rating System (RHIR)**.	Not used; supports analysis	This newsletter focuses on wildland restoration activities in the west. Lower Orogrande proposes road decommissioning and reconstruction work and culvert replacement that fit with the goals of this group.
McCashion, J. D. and R. M. Rice Ph.D. 1983. **Erosion on logging roads in northwestern California: How much is avoidable?**	Not applicable	This document discusses potential types of modeling that may be used to determine the effects of roads. It is dated. Lower Orogrande uses the more recent, peer-reviewed WEPP model to analyze these effects.
McFero III, Grace, J. 2004. **Sediment Plume Development from Forest Roads: How are they related to Filter Strip Recommendations?**	Not used, supports analysis	This document discusses the sediment plumes coming off of roads and their length (range 3-140 meters, average 30 meters). It recommends streamside management zone widths (30 meters on fish bearing streams). Lower Orogrande exceeds those widths by implementing INFISH buffers.
McGarigal, Kevin Ph.D., et. al. 2001. **Cumulative effects of roads and logging on landscape structure in the San Juan Mountains, Colorado (USA)**.	Not used, supports analysis	This document discusses the effects of land management at different scales. Lower Orogrande assesses the effects of roads and logging at the project level and larger cumulative effects level scale.
McLellan, Bruce N. 1990. **Relationships between Human Industrial Activity and Grizzly Bears**.	Not applicable	Not applicable since no grizzly bear are in the area.
Megahan, Walter F. Ph.D. 2003. **Predicting Road Surface Erosion from Forest Roads in Washington State**.	Not used	This document discusses the Washington Surface Erosion Model used by the state of Washington. Lower Orogrande uses WEPP to conduct erosion modeling.

Attachment #4 submitted by Dick Artley	***How Considered?***	***Rationale/Comments***
Noss, Reed F., Ph.D. 1995. **The Ecological Effects of Roads or the Road to Destruction**.	Not used; supports analysis	This opinion piece discusses the effects of all roads in general and potential mitigation measures to reduce the effects.
Ortega, Yvette K.; Capen, David E. 1999. **Effects of forest roads on habitat quality for Ovenbirds in a forested landscape.**	Not applicable	Not applicable, since no Ovenbirds are in the area.
Reed, R.A., Johnson-Barnard, J., and Baker, W.A. 1996. **Contribution of Roads to Forest Fragmentation in the Rocky Mountains**.	Not used, supports analysis	This document supports the wildlife analysis for big game security. Lower Orogrande also decommissions roads as recommended by this paper.
Reid, L. M. Ph.D. and T. Dunne. 1984. **Sediment Production from Forest Road Surfaces.**	Not used, supports analysis	This document supports the watershed analysis for water and sediment yield.
Reid, Leslie M. Ph.D., Robert R. Ziemer Ph.D., and Michael J. Furniss. 1994. **What do we know about Roads?**	Not used, supports analysis	This document discusses the effects of roads on natural resources, which were assess in this project analysis.
Rice, Raymond M. Ph.D., et. al. 1979. **Watershed's Response to Logging and Roads: South Fork of Caspar Creek, California, 1967-1976.**	Not used	Research is outdated, doesn't consider current BMPs.
Riedel, Mark S. Ph.D. and James M. Vose Ph.D. 2002. **Forest Road Erosion, Sediment Transport and Model Validation in the Southern Appalachians.**	Not applicable	This document discusses the validation of the Watershed Characterization System model for estimating sediment. Lower Orogrande uses WEPP for modeling sediment.
Rowland, M. M., et. al. 2005. **Effects of Roads on Elk: Implications for Management in Forested Ecosystems**.	Not used, supports analysis	This document supports the wildlife analysis for big game security.
Schwartz, Chuck Ph.D. - March 1998. **Wildlife and Roads**.	Not applicable	No grizzly bears are located in the project area.
Shanley, James B. and BeverleyWemple Ph.D. 2002. **Water Quantity and Quality in the Mountain Environment**.	Not applicable	This document discusses the effects of ski resort development and snow making on streams in Vermont.
Swift Jr., L. W. **1984. Soil losses from roadbeds and cut and fill slopes in the Southern Appalachian Mountains.**	Not used, supports analysis	This document supports the watershed analysis for water and sediment yield and supports the design measures required for proposed road activities under this project.
Switalski, Adam. 2003. **Where Have All the Songbirds Gone? Roads, fragmentation, and the Decline of Neotropical Migratory Songbirds**. **Wildlands CPR, September 8, 2003.**	Not applicable	Neotropical migratory songbirds are not an issue with the Lower Orogrande project. However, this project does decommission 89 miles of roads to reduce the effects of fragmentation.
Trombulak, Stephen C. Ph.D. and Christopher A. Frissell Ph.D. 2000. **Review of Ecological Effects of Roads on Terrestrial and Aquatic Communities**.	Not used, supports analysis	This document discusses the effects of roads on terrestrial and aquatic resources. It recommends building no roads in sparsely or unroaded areas and encourages removal of unneeded roads. Lower Orogrande does not construct permanent roads and decommissions unneeded roads.
Watson, Mark L. 2005. **Habitat Fragmentation and the Effects of Roads on Wildlife and Habitats.**	Not used, supports analysis	This document supports the wildlife analysis for big game security.
Wisdom, Michael J., et. al. 2000. **Source Habitats for Terrestrial Vertebrates of Focus in the Interior Columbia Basin: Broad-Scale Trends and Management Implications Volume 2 – Group Level Results.**	Not used, supports analysis	This document supports the wildlife analysis for big game security.
Wright, Bronwen, Policy Analyst and Attorney Pacific Rivers Council Excerpt from a May 11, 2009 letter to the Rogue River-Siskiyou National Forest Travel Management Team	Not Used; Supports analysis	This is a site-specific comment letter to the Rogue-Syskiyou NF on their Travel Plan DEIS that addresses the effects of roads on aquatic resources. It recommends closing roads and improving stream crossings to minimize effects. Lower Orogrande decommissions roads and upgrades culverts.
Wuerthner, George. 2008. **Ecological Differences between Logging and Wildfire**.	Not Used	The "article" is George Wuerthner's Blog and not a peer reviewed scientific document. It makes many sweeping claims about logging, such as the shape of harvest units, size of trees removed, snags left behind, etc., and many of the its concerns are mitigated in the Lower Orogrande project."

Attachment #4 submitted by Dick Artley	*How Considered?*	*Rationale/Comments*
Zimmerman, E.A. and P.F. Wilbur. 2004. **A Forest Divided**.	Not used; supports analysis	This non-scientific article discusses forest fragmentation in and the effects on aquatic and terrestrial resources. Lower Orogrande does create new openings, but on a landscape scale. It also decommissions roads to reduce fragmentation effects.

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Glossary

Access — Usually refers to a road or trail route over which a public agency claims a right-of-way available for public or administrative use.

Activity — A measure, course of action, or treatment that is undertaken to directly or indirectly produce, enhance, or maintain forest and range land outputs or achieve administrative or environmental quality objectives.

Activity Fuels — The woody debris generated from any activity on the Forest, such as firewood gathering, precommercial thinning, timber harvesting, and road construction.

Affected Environment — The biological and physical environment that will or may be changed by actions proposed and the relationship of people to that environment.

Age Class Distribution — The range of ages of trees in a particular area, usually grouped in ten year aggregations. A particular stand is usually classified by the predominant age of its overstory trees.

Alternative — One of several policies, plans, or projects proposed for decisionmaking.

Anadromous Fish — Fish which spend much of their adult life in the ocean, returning to inland waters to spawn; eg., salmon, steelhead.

Aquatic Ecosystem — A stream channel, lake, or estuary bed, the water itself, and the biotic communities that occur therein.

Aspect — The compass direction toward which the slope of a land surface faces.

Base Line — With respect to soils, the amount of erosion and sedimentation due to natural sources in the absence of human activity.

Benefit (Value) — Inclusive terms to quantify the results of a proposed activity, project, or program, expressed in monetary or nonmonetary terms.

Best Management Practices (BMPs) — The set of standards in the Forest Plan which, when applied during implementation of a project, ensures that water related beneficial uses are protected and that State water quality standards are met. BMPs can take several forms. Some are defined by State regulation or memoranda of understanding between the Forest Service and the States. Others are defined by the Forest interdisciplinary planning team for application Forestwide. Both of these kinds of BMPs are included in the Forest Plan as forestwide standards.

Big Game — Those species of large mammals normally managed as a sport hunting resource.

Big Game Summer Range — Land used by big game during the summer months.

Big Game Winter Range — The area available to and used by big game through the winter season.

Biological Assessment (BA) — An assessment done to determine whether a given alternative (usually on the preferred) will affect threatened, endangered or 'proposed' animal or plant species.

Biological Evaluation (BE)	An assessment done to determine whether a given alternative (usually on the preferred) will affect sensitive animal or plant species.
Biomass	Vegetative material, live and dead, not meeting merchantability specifications including downed woody debris, brush, and trees.
Board Foot (see also MBF)	A unit measurement represented by a board one foot square and one inch thick.
Browse	Twigs, leaves, and young shoots of trees and shrubs on which animals feed; in particular, those shrubs which are utilized by big game animals for food.
Canopy	The continuous cover of branches and foliage formed collectively by the crowns of adjacent trees and other woody growth.
Cavity	A hollow in a tree which is sued by birds or mammals for roosting and reproduction.
Channel Type	A system developed by hydrologist Dave Rosgen To classify and characterize similar stream channels. Water surface gradient and substrate particle size are the primary stream features used. Other features include bankfull width, width to depth ratio, entrenchment ratio, and floodprone width.
Climax Vegetation	The culminating stage in plant succession for a given site, where the composition of the vegetation has reached a highly stable condition over time and perpetuates itself unless disturbed by outside forces.
Closed Roads	Roads developed and operated for limited use. Public vehicular traffic is restricted except when they are operating under a permit or contract or in an emergency.
Closure	The administrative order that does not allow specified uses in designated areas or on Forest development roads or trails.
Commercial Thinning	Any type of thinning in which all or part of the felled trees are extracted for useful products, regardless of whether their value or size is great enough to defray the cost of the operation. Also see "Thinning." Commercial thinning is an intermediate harvest system.
Commercial Timber Sales	The selling of timber from National Forest lands for the economic gain of the party removing and marketing the trees.
Commodities	Resources with commercial value; all resource products which are articles of commerce, such as timber, range, forage, and minerals.
Cost	The negative or adverse effects or expenditures resulting from an action. Costs may be monetary, social, physical, or environmental in nature.
Council on Environmental Quality (CEQ)	An advisory council to the President established by the National Environmental Policy Act of 1969. It reviews Federal programs for their effect on the environment, conducts environmental studies, and advises the President on environmental matters.

Critical Habitat	Specific areas within the geographic area occupied by a species on which are found those physical and biological features (1) essential to the conservation of the species and (2) which may require special management considerations or protection. Critical habitat does not include the entire geographic area which may be occupied by a Threatened or Endangered species.
Cubic Foot	The amount of wood volume equivalent to a cube one foot by one foot by one foot.
Cultural Resources	The physical remains of human activities, such as artifacts, ruins, burial mounds, petroglyphs, etc., and the conceptual content or context, such as a setting for legendary, historic, or prehistoric events as a sacred area of native peoples, etc., of an area.
Cumulative Effect	The impact on the environment which results from the incremental impact of the action when added to other actions. Cumulative impacts can also result from individually minor but collectively significant actions taking place over a period of time.
Debris Avalanche Potential	The probability of rapid and usually sudden downslope movement of initially consolidated debris. The slippage plane is often hard bedrock and debris avalanches often turn into mudflows as they move down slope and accumulate soil material. Landtype properties used to evaluate this potential are: a) slope gradient, b) slope shape, c) topsoil texture, and d) the occurrence of old slide scars and the accumulation of debris at the slope base.
Deficit Timer Sales	A timber sale that has an appraised value that would produce less than a standard profit and risk margin for an average operator as estimated by the Forest Service appraisal system.
Denning Habitat	Habitat used during parturition and rearing of young until they are mobile.
Desired Future Condition (DFC)	A desired condition of the land to be achieved sometime in the future.
Diameter at Breast Height (DBH)	The diameter of a standing tree at a point measured four feet, six inches above ground level on the uphill side.
Direct Effects	Effects on the environment which occur at the same time and place as the initial cause or action.
Disturbance	Any management activity that has the potential to accelerate erosion or mass movement; also any other activity that may tend to disrupt the normal movement or habits of a particular wildlife species. At the landscape scale, a disturbance would be a force, such as wildfire, disease, or large scale vegetation management, which can significantly alter existing ecosystem conditions.
Diversity	The distribution and abundance of different plant and animal communities and species within an area.

Economic Efficiency	The usefulness of inputs (costs) to produce outputs (benefits) and effects when all costs and benefits that can be identified and valued are included in the computations. Economic efficiency is usually measured using present net value, though use of benefit cost ratios and rates of return may sometimes be appropriate.
Ecosystem	A complete, interacting system of organisms considered together with their environment; a marsh, watershed, or lake, for example.
Effects (or Impacts)	Physical, biological, social, and economic results (expected or experienced) resulting from natural events or management activities. Effects can be direct, indirect, and/or cumulative.
Elk Habitat Effectiveness	Percentage of available (summer) habitat that is useable by elk outside the hunting season.
Elk Security Area	An area elk retreat to for safety when disturbance in their usual range is intensified, such as by logging activities or during the hunting season. To qualify as a security area, there must be at least 250 contiguous acres that are more than 1/2 mile from open roads.
Endangered Species	Any species which is in danger of extinction throughout all or a significant portion of its range, and listed as such by the Secretary of the Interior in accordance with the Endangered Species Act of 1973.
Endemic	Term applied to populations of potentially injurious plants, animals, or viruses that are at their normal, balanced, level, in an ecosystem in contrast to epidemic levels.
Environment	The aggregate of physical, biological, economic, and social factors affecting organisms in an area.
Environmental Analysis	An analysis of alternative actions and their predictable short and long term environmental effects which include physical, biological, economic, social, and environmental design factors and their interactions.
Environmental Assessment (EA)	A concise public document for which a Federal agency is responsible that serves to: (1) briefly provide sufficient evidence and analysis for determining whether to prepare an Environmental Impact Statement or a Finding of No Significant Impact; (2) aid an agency's compliance with the National Environmental policy Act when no Environmental Impact Statement is necessary; and 93) facilitate preparation of an environmental impact statement when one is necessary.
Environmental Impact Statement (EIS)	A concise public document for which a Federal agency is responsible that serves to (1) briefly provide sufficient evidence and analysis for determining whether to prepare an environmental impact statement or a finding of no significant impact; (2) aid an agency's compliance with the National Environmental Policy Act when no environmental impact statement is necessary; and (3) facilitate preparation of an environmental impact statement when one is necessary. Also see DEIS, FEIS.
Epidemic	Plant and animal diseases which rapidly build up to highly abnormal and generally injurious levels.

Erosion	The wearing away of the lands's surface by water, wind, ice, or other physical processes. It includes detachment, transport, and deposition of soil or rock fragments.
Essential Habitat	Areas with essentially the same characteristics as critical habitat but not declared as such. These habitats are necessary to meet recovery objectives for endangered, threatened, and proposed species.
Even Aged Timber Management	The application of a combination of actions that results in the creation of stands in which trees of essentially the same age grow together. Managed even aged forests are characterized by a distribution of stands of varying ages (and, therefore, sizes) throughout the forest area. The difference in age between trees forming the main canopy level of a stand usually does not exceed 20 percent of the age of the stand at harvest rotation age. Regeneration in a particular stand is obtained during a short period at or near the time that a stand has reached the desired age or size for regeneration and is harvested. Clearcut (single stage harvest), shelterwood (two staged harvest), or seed tree cutting methods produce even aged stands.
Floodplain	Low land and relatively flat areas joining streams, rivers, and lakes which are periodically inundated by overbank flows of water.
Forage	All browse and nonwoody plants available to livestock or wildlife for feed.
Forest Land	Land at least 10 percent occupied by forest trees of any size or formerly having had such tree cover and not currently developed for nonforest use. Lands developed for nonforest use include areas for crops, improved pasture, residential, or administrative areas, improve roads of any width, and adjoining road clearing and powerline clearing of any width.
Forest Plan	Clearwater National Forest Land and Resource Management Plan, September, 1987.
Forest Type	A classification of forest land based on the live tree species present.
Fuels	Includes both living plants and dead, woody vegetation that are capable of burning.
Geographic Information System (GIS)	A computer program for manipulating landscape configuration data.
Geomorphic Threshold	The percent increase of sediment over normal or natural conditions which may result in unstable channel conditions in a stream system .
Habitat	Areas or features of the forest which are important for maintaining healthy, productive wildlife, fish or plant populations. Special features may include riparian areas; old forest conditions; hiding or security cover; critical breeding and rearing areas; and/or space to establish territories or home ranges.
Habitat Type	An aggregation of all land areas potentially capable of producing similar plant communities at climax.
Hiding Cover	Trees of sufficient size and density to conceal animals from view at 200 feet.

Home Range	That area used by an individual (animal), either during the entire calendar year or seasonally, in its normal activities of foraging, mating, and rearing of young. The entire area of the home range is usually not defended, and individual home ranges may overlap. Home ranges may be occupied by an individual, a pair, a family group, or a social group consisting of several families.
Hydrologic Recovery	The process of revegetation of a disturbed area which returns the site to predisturbance levels of water runoff and timing of flow.
INFISH	The Decision Notice/Decision Record, Finding of No Significant Impact, and Environmental Assessment for the Interim Strategies for Managing fish-producing watersheds in Eastern Oregon and Washington, Idaho, Western Montana, and Portions of Nevada. Published by the USDA, Forest Service in 1995.
Indicator Species	Species identified in a planning process that are used to monitor the effects of planned management activities on viable populations of wildlife and fish, including those that are socially or economically important. See Management Indicator Species.
Interdisciplinary Team (IDT, ID Team)	A group of individuals with different training assembled to solve a problem or perform a task. The team is assembled out of recognition that no one scientific discipline is sufficiently broad to adequately solve the problem. Through interaction, participants bring different points of view to bear on the problem.
Intermediate Harvest	Any removal of trees from a stand between the time of its formation and the regeneration cut. Most commonly applied intermediate cuttings are release, thinning, improvement and salvage.
Intermittent Stored Service Roads	These are roads determined to be needed in the future, but not presently. Intermittent stored service roads are not accessible for administrative purposes, including maintenance. For this reason, they are left in a condition where there is little resource risk without maintenance (typically 20 years or more).
Inventory Data	Recorded measurements, facts, evidence, or observations of forest resources such as soil, water, timber, wildlife, range, geology, minerals, and recreation, which is used to determine the capability and opportunity of the forest to be managed for those resources.
Irretrievable	Foregone or lost production, harvest, or use of renewable natural resources. For example, when fire destroys a tree plantation, the effect is irretrievable but the loss of site productivity as measured by the presence of trees is not irreversible.
Irreversible	The removal of resources such that they cannot be produced gain. This applies most commonly to nonrenewable resources such as minerals or cultural resources, or to resources such as soil productivity that are renewable only over long periods of time. Loss of renewable resources can also be irreversible as in the replacement of a forest with a road.
Issue	A subject or question of widespread public discussion or interest regarding management of National Forest System lands.

Land Allocation	The assignment of a management emphasis to particular land areas to achieve the goals of the issues, concerns, and opportunities identified during the planning process.
Landtype, Landtype Association (LTA)	Landtypes are ecological land units based on similarities in soils, landforms, geologic substrate, geomorphic processes, and plant associations. Landtypes have been mapped for the entire Clearwater National Forest with watershed, engineering, silviculture, and wildlife resource interpretations having been determined for each landtype. Landslide hazards, evaluated in terms of mass wasting and debris avalanche potentials, were determined for each landtype based on site characteristics and were calibrated based on actual landslide occurrence during 1974-1976 storm events.
Low-relief, Rolling Hills	Landforms of intense chemical and physical weathering processes characterized by deep, productive soils usually with a thick (12"+) Mazama volcanic ash layer. These landscapes are dominated by high density drainage patterns with low vertical relief. Slopes are generally less than 30% so erosion is normally low on this LTA group. Fire occurs as very infrequent, lethal burns with intervals ranging from 151 to 300 years with periodic mixed lethal/nonlethal events occurring in smaller areas at more frequent intervals
Management Area	An aggregation of capability areas which have common management direction and may be noncontiguous in the forest. Consists of a grouping of capability areas selected through evaluation procedures and used to locate decisions and resolve issues and concerns.
Management Direction	A statement of multiple use and other goals and objectives, the associated management prescriptions and the associated standards and guidelines for attaining them.
Management Indicator Species (MIS)	A plant or animal which, by its presence in a certain location or situation, is believed to indicate the habitat conditions for many other species.
Management Practice	A technique or procedure commonly applied to forest resources, resulting in measurable outputs or activities.
Mass Wasted Slopes	Landforms that have previously experienced large mass movement erosion events. They are generally found adjacent to breakland landforms, and have similar vegetation characteristics as well as erosion and fire disturbance patterns. For the purposes of this analysis, mass wasted LTAs, were combined with the breakland LTAs which have similar properties.
Mass Wasting Potential	The relative potential for mass soil movement caused by gravitational forces. It involves the movement of regolith as a coherent mass along a slippage plane created due to subsurface water concentration. Landtype properties used to evaluate this potential are: a) slope gradient, b) presence of concentrated subsurface groundwater, c) substratum texture, d) regolith depth, and e) presence of mica.
Mature Timber	Stands of trees which have achieved or exceeded culmination of mean annual increment.

Mitigation	Avoiding or minimizing impacts by limiting the degree or magnitude of the action and its implementation; rectifying the impact by repairing, rehabilitating, or restoring the affected environment; reducing or eliminating the impact by preservation and maintenance operations during the life of the action.
Model	A theoretical projection in detail of a possible system of natural resource relationships. A simulation based on an empirical calculation to set potential or outputs of a proposed action or actions.
Monitoring	An examination, on a sample basis of Forest Plan management practices, to determine how well objectives have been met and a determination of the effects of those management practices on the land and environment.
National Forest System (NFS)	All National Forest lands reserved or withdrawn from the public domains of the United States; all National Forest lands acquired through purchase, exchange, donation, or other means; the National Grasslands and land utilization projects administered under Title III of the Bankhead-Jones Farm Tenant Act (50 Stat. 525, 7 U.S.C. 1010-1012); and other lands, waters, or interests therein which are administered by the Forest Service or are designated for administration through the Forest Service as part of the system.
National Register of Historic Places	A listing maintained by the National Park Service of areas which have been designated as being of historical value. The Register includes place of local and State significance as well as those of value to the nation as a whole.
Natural Sediment Production	The amount of sediment produced in a watershed prior to any management activities such as roads or harvest. Natural, or baseline, sediment is a function of parent material, soil type, degree of weathering, glacial influences, etc.
Nonstocked	Deforested land where woody vegetation is less than 15 feet tall and produces less than 40 percent crown cover as determined by aerial photogrammetry.
Noxious Weed	Plants that have been designated by federal, state, or county officials and defined as, " A plant that interferes with management objectives for a given area of land at a given point in time." The Idaho Noxious Weed Law defines a "noxious weed" as any exotic plant species that is established or that may be introduced in the State, which may render land unsuitable for agriculture, forestry, livestock, wildlife, or other beneficial, uses and is further designated as either a State-wide or County-wide noxious weed (Idaho Code 24 chapter 22).
Objective	A specified statement of measurable results to be achieved within a stated time period. Objectives reflect alternative mixes of all outputs of achievements which can be attained at a given budget level. Objectives may be expressed as a range of outputs.
Off Highway Vehicle (OHV)	Vehicles such as four and three wheelers, motorcycles, and bicycles which are designed to operate on primitive roads and trails, or to navigate cross country where there are no constructed travelways.

Old Growth Analysis Unit (OGAU)	Assessment of old growth involved sub-dividing the Forest into old growth analysis units, averaging approximately 10,000 acres in size. These analysis areas were identified and mapped to conform to 'compartments' identified through the timber data base recording keeping system. The resulting old growth analysis units very often are aligned along topographic breaks, like major drainages.
Old Growth Habitat	A community of forest vegetation which has reached a late stage of plant succession characterized by diverse stand structure and composition along with a significant showing of decadence. Per interim CNF direction (July 1998), old growth habitat is generally defined on the CNF as "…a stand of trees 160 years or older and 25 acres or larger in size."
Opportunity	A proposal that is considered in developing alternative activities, projects, or programs where an option exists to invest profitably or to improve or maintain a present condition.
Overmature Timber	Trees that have attained full development, particularly in height, and are declining in vigor, health, and soundness.
Overstory	The tallest component of a forest stand which usually dominates the competition for sunlight and available nutrients.
Parent Material Erosion Potential	Raindrop splash and overland flow erosion that occur in deep excavations. Landtype properties used to evaluate this potential include parent material characteristics such as: a) extent of bedrock weathering , b) rock fragment content, and c) substratum permeability.
Perennial Stream	A stream which normally flows throughout the year.
Potential Elk Habitat	Refers to habitat quality. 100 percent potential means that a site has the optimum amount of habitat factors, including security, to permit elk use at the maximum potential for the site.
Precommercial Thinning	This treatment cuts the least desirable trees in an immature stand to accelerate the growth and improve the average form of the remaining desirable crop trees.
Preferred Alternative	The agency's preferred alternative, one or more, that is identified in the impact statement.
Prescribed Fire	A fire burning under specified conditions which will accomplish planned objectives in strict compliance with an approved plan and the conditions under which the burning takes place, and the expected results are specific, predictable, and measurable.
Prescription	Management practices selected and scheduled for application on a designated area to attain specific goals and objectives.
Proposed Action	In terms of the National Environmental Policy Act, the project, activity, or action that a Federal agency intends to implement or undertake and which is the subject of an environmental analysis.

Public Involvement	A Forest Service process designed to broaden the information based upon which agency decisions are made by (1) informing the public about Forest Service activities, plans, and decisions, and (2) encouraging public understanding about and participation in the planning processes which lead to final decision making.
Reforestation	The renewal of forest cover by seeding, planting, and natural means.
Regeneration	The renewal of a tree crop, whether by natural or artificial means.
Revegetation	The reestablishment and development of plant cover. This may take place naturally through the reproductive rpocesses of the existing flora or artificially through the direct action of man; eg., reforestation, range reseeding.
Riparian Areas	Areas with distinctive resource values and characteristics that are comprised of aquatic and riparian ecosystems, 100-year floodplains and wetlands. They also include all upland areas within a horizontal distance of approximately 100 feet from the edge of perennial streams or other perennial water bodies.
Road Decommissioning	Reducing the risk of sediment entering live streams and encouraging the natural flushing of instream sediments, forest roads no longer needed for management, are obliterated (decommissioned). Practices involve the use of heavy equipment (excavators and dozers) to remove culverts, improve drainage, reduce road fills, and scarify compacted surfaces to promote revegetation. Removing redundant or unneeded roads from the forest improves watershed condition and reduce road maintenance costs. Roads chosen for obliteration are those which have been identified through inventory as having a high potential to fail and/or deposit large amounts of sediment and debris into streams, or are currently causing severe erosion into streams.
Rotation	The planned number of eyars between the formation of generaton of tres and their harvest at a specified stage of maturity.
Sapling	A size category for forest stands in which the trees are between 1.0 to 4.9 inches in diameter at breast height and are the predominant vegetation.
Sawtimber	Trees containing at least one 8-foot pierce with a 5.6 inch diameter inside bark at the small end and meeting regional specification for freedom from defect. Softwood trees must be at least 8 inches DBH for all species except lodgepole pine which will be 7 inches DBH. Large sawtimber is defined as trees 18.0 inches and larger DBH and small sawtimber as trees with DBH between 9.0 and 17.9 inches.
Scoping	The procedures by which the Forest Service determines the extent of analysis necessary for a proposed action; i.e., the range of actions, alternatives and impacts to be addressed, identification of significant issues related to a proposed actin, and establishing the depth of environmental analysis, data, and task assignments needed.
Sediment	Any material, carried in suspension by water, which will ultimately settle to the bottom of streams.

Sediment Delivery Efficiency
Capability of a landtype to deliver sediment produced from on-site sources to streams. The delivery efficiency rating reflects the delivery of naturally produced sediment on slopes as well as the accelerate mass movement through management activities. Landtype properties used to evaluate this potential are: a) slope gradient, b) slope dissection, and c) slope shape.

Seedling
A size category for forest stands in which the trees are between 9 and 0.9 inches in diameter at breast height and are the predominant vegetation.

Sensitive Species
Species (plants or animals) with special habitat needs that may be influenced by management programs.

Seral
A biotic community which is developmental; a transitory stage in an ecologic succession.

Skyline Logging
Use of Cable system to skid logs with either one end suppended or full supension.

Silviculture
The art and science of growing and tending forest vegetation; i.e., controlling the establishment, composition and growth of forests, for specific management goals.

Silviculture Systems
A management process whereby forests are tended, harvested, and replaced, resulting in a forest of distinctive form. It includes all cultural management practices performed during the life of the stand such as regeneration cutting, fertilization thinning, improvement cutting, and use of genetically improved tree seeds and seedlings to achieve multiple resource benefits. Systems are classified according to the method of carrying out the fellings that remove the mature crop and provide for regeneration and according to the type of forest they produce.

Site Preparation
The preparation of the ground surface prior to reforestation. Various treatments are applied as needed to control vegetation that will interfere with the establishment of the new crop of trees or to expose the mineral soil sufficiently for the establishment of the species to be reproduced.

Site Productivity
The production capability of specific areas of land.

Skid Trails
A travelway through the woods formed by loggers dragging (skidding) logs from the stump to a log landing without dropped a blade and without purposefully changing the geometric configuration of the ground over which they travel.

Slash
The residue left on the ground after felling and other silvicultural operations and/or accumulating there as a result of storm, fire, girdling, or poisoning.

Snag
A standing dead tree used by birds for nesting, roosting, perching, courting, or foraging for food and by some mammals for escape cover, denning, and reproduction.

Soil Productivity
The capacity of a soil to produce a specific crop such as fiber and forage, under defined levels of management. It is generally dependent on available soil moisture and nutrients and length of growing season.

Stand	A plant community of trees which possess uniformity in vegetation type, age class, vigor, size class, and stocking class and one which is distinguishable from adjacent forest communities.
Stand Replacing Fire	An intense (severe) fire (prescribed/planned or unplanned) resulting in effectively killing most trees within a stand.
Standard	An objective requiring a specific level of attainment; a rule to measure against; a guiding principle.
Stocking	A measure of timber stand density as it related to the optimum or desired density to achieve a given management objective.
Stream Order	A measure of the position of a perennial stream in the hierarchy of tributaries. First order streams are unbranched streams; they have no tributaries. Second order streams are formed by the confluence of two mor more first order streams. Third order streams are formed by the confluence of two or more second order streams; they are considered third order until they join another third order or larger stream.
Succession	A relatively predictable process of changes in structure and composition of plant and animal communities over time. Conditions of the prior plant community or successional stage create conditions that are favorable for the development of the next succession stage.
Successional Stage	A phase in the gradual supplanting of one community of plants by another.
Surface Erosion Potential	Raindrop splash and overland flow erosion on soils bared of vegetation, but which retain the root mat and soil structure. This potential is used for predicting surface erosion following prescribed or natural fires. Landtype properties used to evaluate this potential are: a) volcanic ash topsoil characteristics, b) slope gradient, c) depth to restricting layers, and d) slope shape. The presence of the Mazama volcanic ash cap plays an important role in surface erosion potential since this material is extremely permeable, has a high water holding capacity, and thus is seldom associated with overland flow.
System Road (Forest System Road)	A road that is part of the Forest development transportation system, which includes all existing and planned roads, as well as other special and terminal facilities designated as Forest development transportation facilities.
Temporary Roads	Roads which are constructed for a one time or short term use which are not expected to be utilized in the future. These roads will be obliterated after the need is past.
Thermal Cover	Cover used by animals to ameliorate effects of weather; for elk, a stand of coniferous trees 40 feet or taller with an average crown closure of 70 percent or more.
Thinning	A felling made in an immature stand in order to accelerate diameter increment, but also by suitable selection to improve the average form of the trees that remain without permanently breaking the tree canopy.

Threatened or Endangered Species	Any species, plant or animal, which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. Threatened species are identified by the Secretary of the Interior in accordance with the Endangered Species Act (1973).
Timber	A general term for the major woody growth of vegetation in a forest area.
Topography	The configuration of land surface including its relief, elevation, and the position of its natural and man made figures.
Tractor Logging	Any logging method which uses a tractor as a motive power for transporting logs, either by dragging or carrying, from the stumps to a collecting point (log landing).
Trailhead	The parking, signing, and other facilities available at terminus of a trail.
Understory	Vegetation (trees or shrubs) growing under the canopy formed by taller trees.
Uneven Aged Management	The application of a combination of actions needed to simultaneously maintain continuous high forest cover, recurring regeneration of desirable species, and the orderly growth and development of trees through a range of diameter or age classes to provide a sustained yield of forest products. Cutting is usually regulated by specifying the number or proportion of trees of particular sizes to retain within each area, thereby maintaining planned distribution of size classes. Cutting methods that develop and maintain uneven aged stands are single tree selection and group selection.
Visual Quality Objectives (VQOs)	The degree of acceptable alteration of the characteristic landscape.
WATBAL	A computer model that analyzes and predicts effects of activities on water quality and quantity.
Watershed	The total area above a given point on a stream that contributes water to the flow at that point.

INDEX

APPENDIX A

Past, Present, Foreseeable Future Activities

Past Actions: (see attached map)

Decade	Activity	Acres
1960s	Regeneration Harvest*	7,436
	Intermediate Harvest**	891
1970s	Regeneration Harvest	1,267
	Intermediate Harvest	753
1980s	Regeneration Harvest	1,105
	Intermediate Harvest	1,411
1990s	Regeneration Harvest	727
	Intermediate Harvest	900
2000	Regeneration Harvest	577
	Intermediate Harvest	108

*Regeneration harvest includes clearcut, seed tree, and shelterwood prescriptions.
**Intermediate harvest includes commercial thinning, selection cut, and salvage prescriptions.

Present Actions: There are no present actions occurring on Forest Service lands within the Lower Orogrande project area. On-going activities on State lands, west of the project area, are discussed in the next section (foreseeable future actions).

Foreseeable Future Actions (see attached maps):

Orogrande OHV Trail Project

This project would provide an OHV loop system on 60 miles of National Forest roads and trails in the Orogrande Creek area of the North Fork District. The proposed route continues onto 8.7 miles of Roads 5055, 5055A and 669 on lands owned by Potlatch Corporation and Idaho Department of Lands (IDL). These roads are currently open to public access, but public use is subject to rules and regulations determined by the private landowners. This project consists of the following activities:

- Construct 1.7 miles of new trail consisting of 5 short segments.
- Reconstruct 1.2 miles of Trail 17 to accommodate all-terrain vehicles (ATVs).
- Reconstruct 2.9 miles of Trail 88 to accommodate ATVs.
- Change travel restrictions on 1.2 miles of Trail 17 to permit ATV traffic
- Change travel restrictions on 12.6 miles of Forest Roads 5201, 5209, 5214, 5227A, 5235,
- 5235C, 5240, 5240B and 73005 as shown below:

Proposed Travel Restriction Changes

Road/ Trail#	Current restriction & reason for restriction	Proposed restriction	Miles affected
5201	RYA*; wildlife	OYS***	0.15
5209	RYA except snowmobiles; soil, water	OYS	4.37
5214	RYA except snowmobiles; soil, water	OYS	0.41
5227A	RYA except snowmobiles; wildlife	OYS	0.36
5235	RYA except snowmobiles; wildlife	OYS	1.84
5235C	RYA except snowmobiles; wildlife	OYS	0.60
5240	RYA; wildlife	OYS	3.08
5240B	RYA except snowmobiles; wildlife	OYS	0.52
73005	RYA except snowmobiles; soil, water, wildlife	OYS	1.29
Total Road Miles			**12.62**
Trail 17	OYM**	OYS	1.2
Total Trail Miles			**1.2**

*RYA – Restricted yearlong to all motorized vehicles

**OYM – Open yearlong to motorcycles

***OYS – Open yearlong to small vehicles < 50" (ATVs and motorcycles, but not UTVs)

Trail construction standards would include a tread width of up to 6 feet, clearing width of up to 12 feet, and a desired maximum sustained grade of 15%. Grades may vary up to 25% in short pitches or climbing turns. Drainage dips would be installed on sustained grades, about 100 feet apart. Where needed, vegetation would be cleared on roads and trail tread established.

French Larch Project

The 18,000-acre French Larch project area is located south of the Lower Orogrande project area within the French and Larch Creek drainages. The following activities are proposed:

<u>Timber Harvest</u>

1,989 acres of regeneration harvest

334 acres of commercial thinning

645 acres of precommercial thinning

- Construct 10 miles of temporary roads, to be decommissioned after use.

<u>Watershed Improvements</u>

Decommission 8.4 miles of existing roads

Place into storage 10 miles of existing roads

Barnyard South Sheep Project

The 17,570-acre Barnyard South Sheep project area is located north of the Lower Orogrande project area within the Washington Creek watershed that drains into the North Fork Clearwater River.

<u>Watershed Improvements</u>

Decommission 44.6 miles of system roads and 31.0 miles of non-system roads.

Place into storage 28.4 miles of system roads and 20.6 miles of non-system roads.

<u>Timber Harvest</u>

840 acres of regeneration harvest

745 acres of commercial thinning

- Construct 7.8 miles of temporary roads, to be decommissioned after use.
- Reconstruct 21.0 miles of system roads and 9.1 miles of non-system roads.

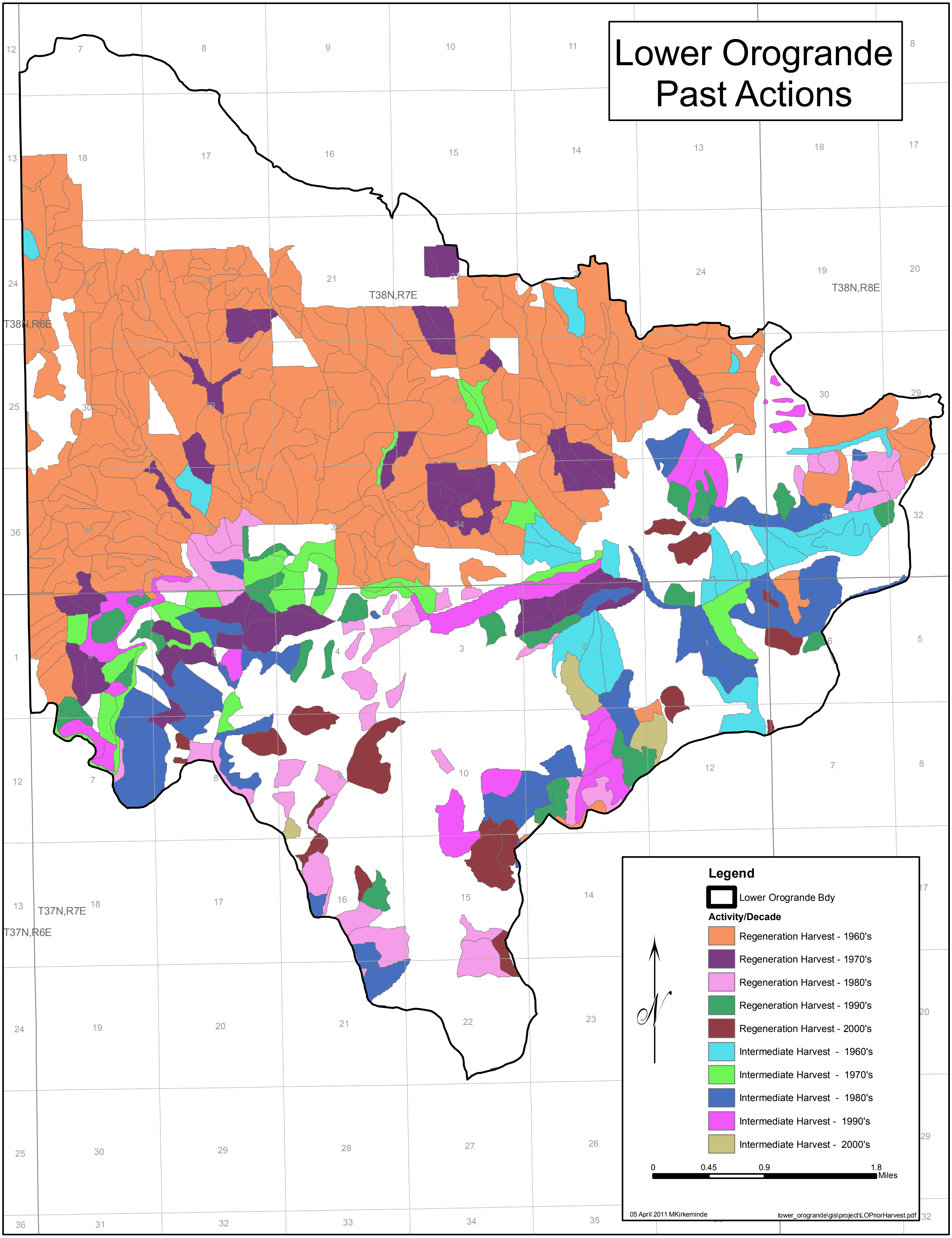
Note: Both of these projects are shown here for reference only, since neither project area overlaps with the Lower Orogrande project area, which was defined as the geographic area used for each resource cumulative effects analysis.

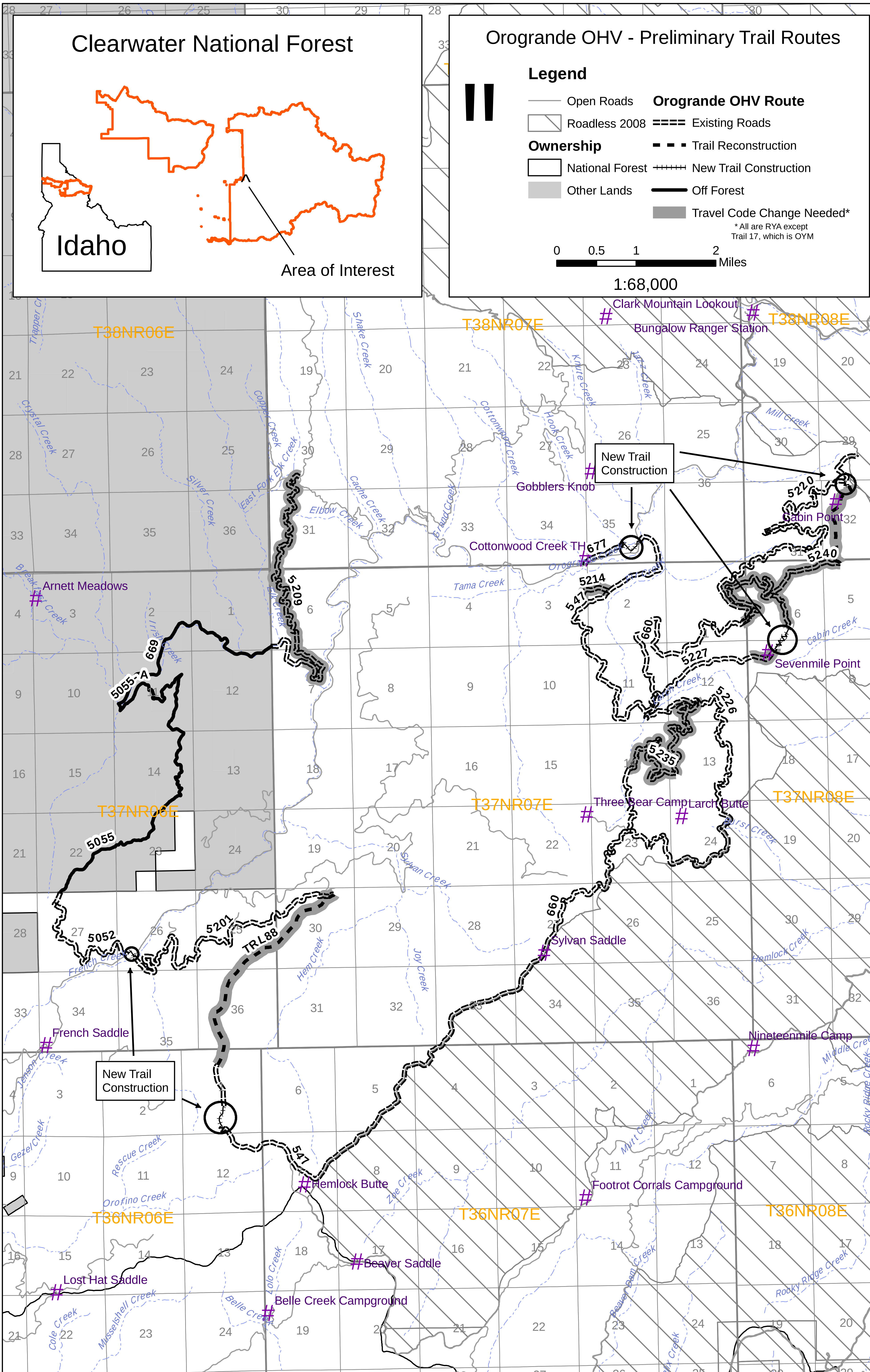
State Lands[1] (see attached map)

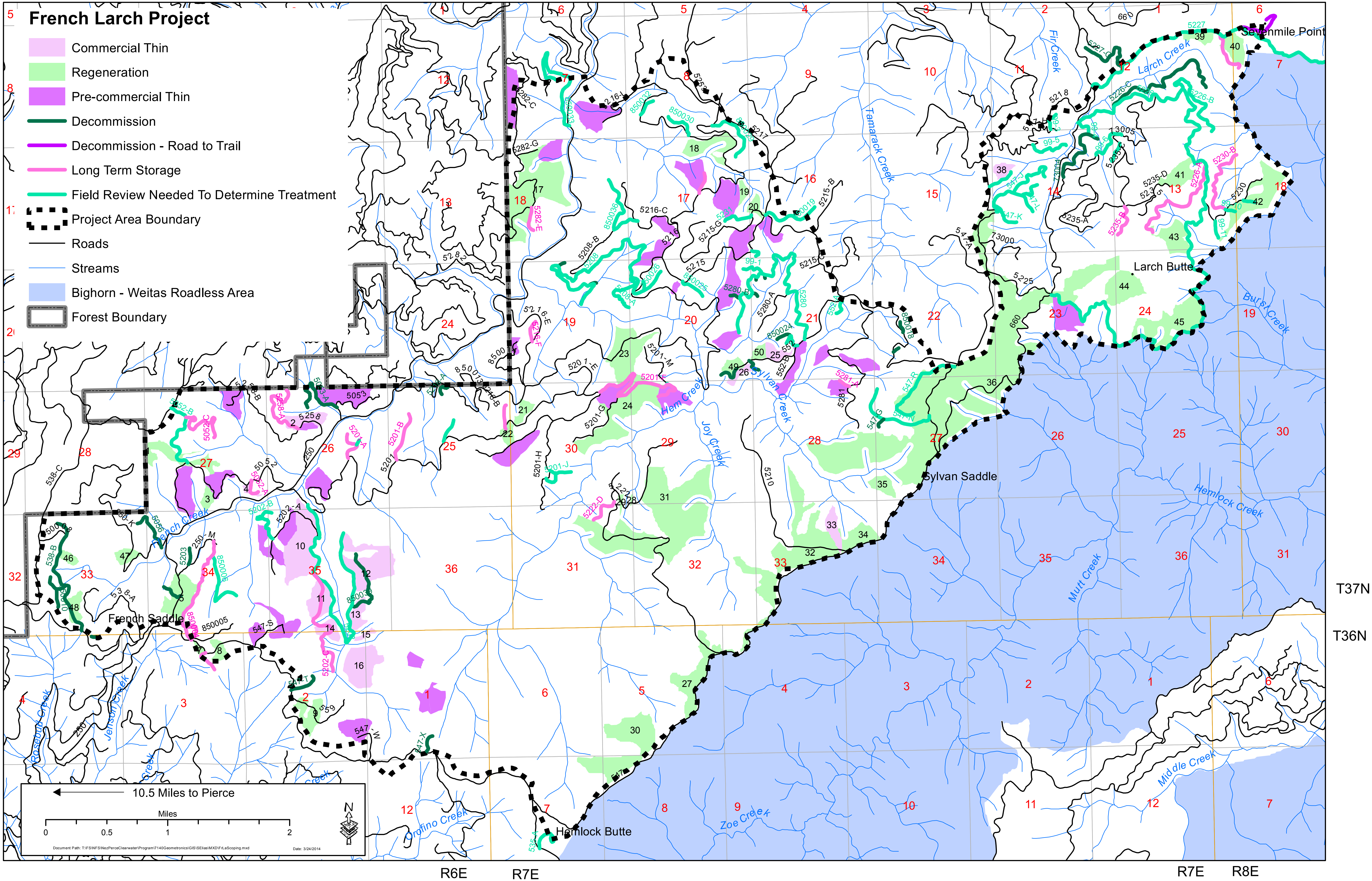
Sale name	Location	Acres	Volume (MBF)	Miles of New Road Construction	Year Planned
South Shanghai Resale	Sec 16, T36N, R6E	287	1,570	0	Active
North Shanghai	Sec 9 & 16, T37N, R6E	190	3,800	0	Active
French Fry	Sec 13 & 14, T37N, R6E	140	5,300	0.1	Active
Johnson Gulch Relog	Sec 23 & 24, T37N, R6E	104	1,745	0.2	Active
Breakfast Shelter	Sec 28 & 33, T38N, R6E	260	3,000	2.0	2014

[1] Private lands owned by the Potlatch Corporation are also located west of the Lower Orogrande project area. However, information about foreseeable activities on their lands was unobtainable.

Lower Orogrande Past Actions

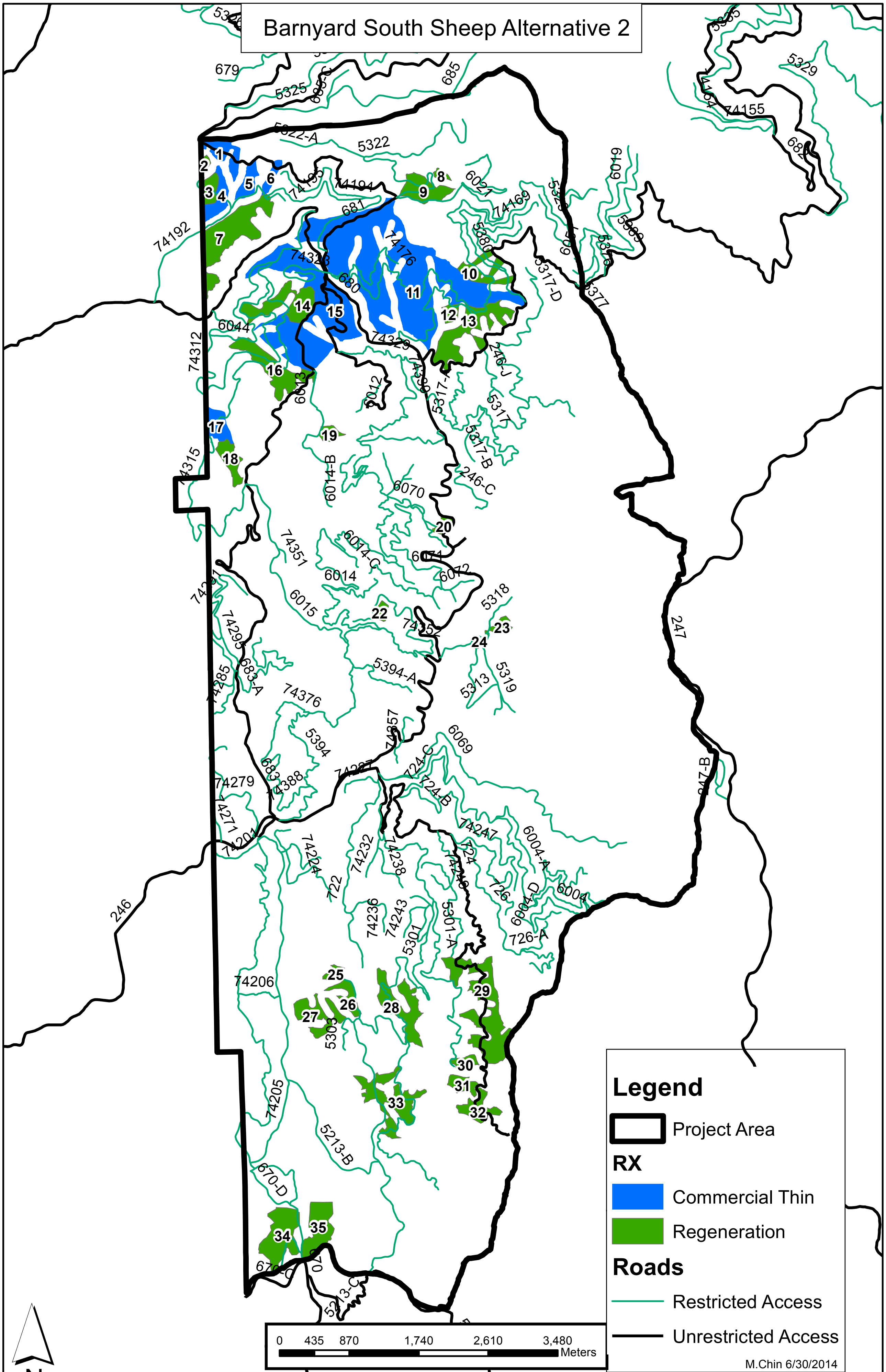



Orogrande OHV - Preliminary Trail Routes
Clearwater National Forest
Idaho
Area of Interest
Legend
Open Roads
Roadless 2008
Ownership
National Forest
Other Lands
Orogrande OHV Route
Existing Roads
Trail Reconstruction
New Trail Construction
Off Forest
Travel Code Change Needed*
* All are RYA except
Trail 17, which is OYM
0
0.5
1
2
Miles
1:68,000
T38NR06E
T38NR07E
T38NR08E
T37NR06E
T37NR07E
T37NR08E
T36NR06E
T36NR07E
T36NR08E
Clark Mountain Lookout
Bungalow Ranger Station
Gobblers Knob
Cottonwood Creek TH
Cabin Point
Sevenmile Point
Arnett Meadows
Three Bear Camp
Larch Butte
Sylvan Saddle
French Saddle
Nineteenmile Camp
Hemlock Butte
Footrot Corrals Campground
Beaver Saddle
Lost Hat Saddle
Belle Creek Campground
New Trail Construction
New Trail Construction
5209
669
5055-A
5055
5052
5201
TRL88
660
547
677
5214
5220
5240
5227
5226
5235
Trapper Creek
Crystal Creek
Copper Creek
Silver Creek
East Fork Elk Creek
Elk Creek
Snake Creek
Elbow Creek
Cache Creek
Cottonwood Creek
Hook Creek
Knife Creek
Mill Creek
Cabin Creek
Tama Creek
Orogrande
Irish Creek
French Creek
Hem Creek
Joy Creek
Sylvan Creek
Hemlock Creek
Middle Creek
Rocky Ridge Creek
Gezel Creek
Rescue Creek
Orofino Creek
Zoe Creek
Lolo Creek
Belle Creek
Cole Creek
Musselshell Creek
Beaver Dam Creek
Felt Creek
Johnson Creek
Break Creek



French Larch Project
Commercial Thin
Regeneration
Pre-commercial Thin
Decommission
Decommission - Road to Trail
Long Term Storage
Field Review Needed To Determine Treatment
Project Area Boundary
Roads
Streams
Bighorn - Weitas Roadless Area
Forest Boundary
Sevenmile Point
Larch Creek
Fir Creek
Tamarack Creek
Larch Butte
Burst Creek
Sylvan Creek
Hem Creek
Joy Creek
Sylvan Saddle
Hemlock Creek
Mutt Creek
French Creek
French Saddle
Jenson Creek
Rosebud Creek
Orofino Creek
Hemlock Butte
Zoe Creek
Middle Creek
T37N
T36N
R6E
R7E
R7E
R8E
10.5 Miles to Pierce
Miles
0
0.5
1
2
N

Barnyard South Sheep Alternative 2



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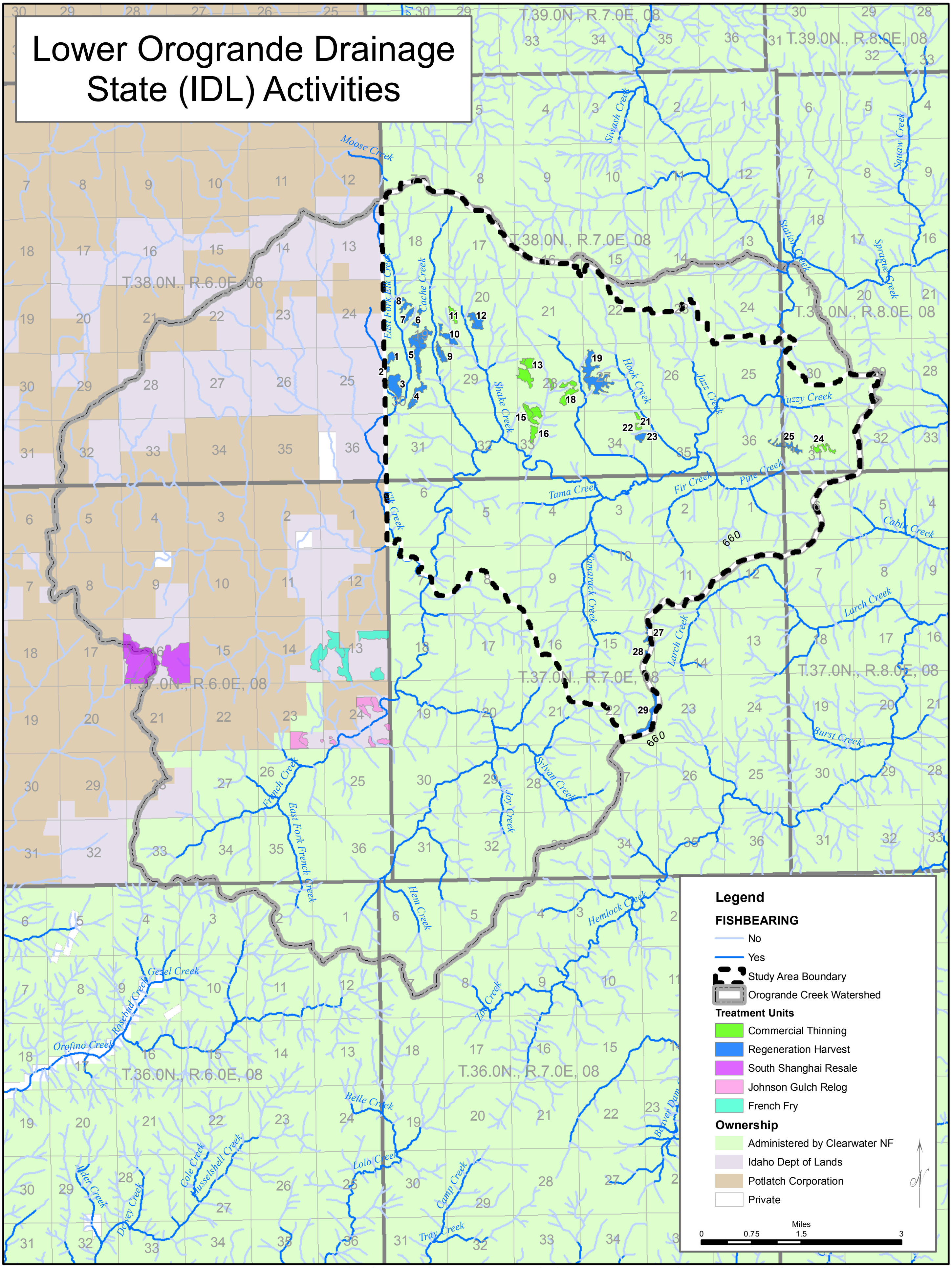

Lower Orogrande Drainage
State (IDL) Activities
Legend
FISHBEARING
No
Yes
Study Area Boundary
Orogrande Creek Watershed
Treatment Units
Commercial Thinning
Regeneration Harvest
South Shanghai Resale
Johnson Gulch Relog
French Fry
Ownership
Administered by Clearwater NF
Idaho Dept of Lands
Potlatch Corporation
Private
Miles
0 0.75 1.5 3
T.39.0N., R.7.0E, 08
T.39.0N., R.8.0E, 08
T.38.0N., R.7.0E, 08
T.38.0N., R.6.0E, 08
T.38.0N., R.8.0E, 08
T.37.0N., R.6.0E, 08
T.37.0N., R.7.0E, 08
T.37.0N., R.8.0E, 08
T.36.0N., R.6.0E, 08
T.36.0N., R.7.0E, 08
Moose Creek
Siwash Creek
Squaw Creek
Station Creek
Sprague Creek
East Fork Elk Creek
Cache Creek
Shake Creek
Hook Creek
Jazz Creek
Fuzzy Creek
Tama Creek
Fir Creek
Pine Creek
Elk Creek
Cabin Creek
Tamarack Creek
Larch Creek
Sylvan Creek
Joy Creek
French Creek
East Fork French Creek
Burst Creek
Hem Creek
Hemlock Creek
Gezel Creek
Rosebud Creek
Orofino Creek
Belle Creek
Lolo Creek
Camp Creek
Tray Creek
Beaver Dam
Cole Creek
Musselshell Creek
Alder Creek
Dewey Creek
660

APPENDIX B

Watershed Improvements

Culvert Replacements (see attached map)

Drainage	Road Number	Comment	Cost	Priority
Elk	5054	Undersized, inlet almost plugged	$60,000	High
Copper	5054-A	Undersized	$60,000	Moderate
Cache	250	Undersized, fish barrier due to flow	$120,000	High
Shake #1	250	Undersized, outlet jump, fish barrier	$150,000	High
Shake #2	5213	Undersized, alignment off, fish barrier due to flow	$130,000	High
Shake #3	810295	Undersized, inlet plugged, no fish passage	$100,000	High
Shake #4	810295	Undersized, small outlet drop	$60,000	Moderate
Shake #5	810293	Failed log structure, water under logs, vertical approaches	$80,000	High
Cottonwood	250	Undersized, over-sloped, partial fish barrier	$80,000	High
Hook #1	677	Undersized, 7’ outlet drop, deep fill, fish barrier	$150,000	High
Hook #2	677	Undersized, alignment off, fish barrier	$130,000	High
Hook #3	5213	Undersized, poor condition, alignment off, shallow fill	$60,000	High
Pine #1	660	Undersized, fish barrier	$120,000	High
Pine #2	660	Undersized, fish barrier	$150,000	High
Pine #3	660	Undersized, 3’ outlet drop, failure potential	$30,000	High
Fuzzy	5220	Undersized, poor condition, water under pipe, deep fill	$80,000	High
		Total Estimated Cost	**$1,560,000**	

Road 547 Reconstruction

Road 547 would be reconstructed to provide alternate access to areas currently accessed by a 2-mile segment of Road 660 that is high priority for decommissioning.

Road Decommissioning (see attached map)

Road Number † ^	Length (Miles)	Estimated Cost*	Priority**		Road Number	Length (Miles)	Estimated Cost*	Priority**
660	2.0	30,000	High		810145	0.6	6,000	Low
677-D	0.5	5,000	Low		810147	0.5	5,000	Low
5214-A	1.2	12,000	Low		810148	0.2	2,000	Low
5247	1.0	10,000	High		810149	0.3	3,000	Low
5251	1.1	11,000	Moderate		810150	0.1	1,000	Low
5251-A	2.4	24,000	High		810151	0.3	3,000	Low
5251-B^	0.9	6,000	High		810152	0.6	6,000	Low
73013	1.1	11,000	Low		810153^	0.6	3,000	High
73014	0.3	3,000	Low		810154	0.4	4,000	Low
73015	1.1	11,000	Moderate		810155	1.0	8,000	Low
73016	0.4	4,000	Moderate		810156	0.1	1,000	Low
73019	0.3	3,000	Low		810157	0.1	1,000	Low
73020	0.5	5,000	Low		810158	0.1	1,000	Low
73021	0.2	2,000	Low		810159	0.7	7,000	Low
73023	2.0	20,000	High		810160	0.3	3,000	Low
73072	0.3	3,000	Low		**810161†**	0.9	9,000	Low
73073	0.2	2,000	Low		810162	0.2	2,000	Low
810102	0.4	4,000	Low		810165	0.3	3,000	Low
810103	0.9	9,000	Low		810166	0.4	4,000	Low
810105	0.8	8,000	Low		810167	0.1	1,000	Low
810110	0.8	8,000	Low		810169	0.1	1,000	Low
810133	0.3	3,000	Low		810171	0.4	4,000	Low
810134	1.5	15,000	Low		810172	0.1	1,000	Low
810135	0.2	2,000	Low		810174	0.5	5,000	Low
810136	0.1	1,000	Low		810175	0.2	2,000	Low
810137	0.2	2,000	Low		810176	0.1	1,000	Low
810138	0.1	1,000	Low		810177	0.1	1,000	Low
810139	0.1	1,000	Low		810178	0.4	4,000	Low
810140	0.3	3,000	Low		810179	0.2	2,000	Low
810143	0.4	4,000	Low		810181	1.2	12,000	Low
810144	1.3	13,000	Low		810184	0.2	2,000	Low
					810185	0.9	9,000	Low
					810186	0.5	5,000	Moderate

Road Number	Length (Miles)	Estimated Cost*	Priority		Road Number	Length (Miles)	Estimated Cost*	Priority
810187	0.1	1,000	Moderate		810228	0.1	1,000	Low
810188	0.4	4,000	Low		810229	0.1	1,000	Low
810189	0.1	1,000	Low		810230	0.1	1,000	Low
810190	0.1	1,000	Low		810231	0.1	1,000	Low
810191	0.1	1,000	Low		810232	0.2	2,000	Low
810192	0.5	5,000	Moderate		810233	0.2	2,000	Low
810193	0.1	1,000	Low		810234	0.1	1,000	Low
810194	0.2	2,000	Low		810235	0.1	1,000	Low
810195	0.3	3,000	Low		810236	0.1	1,000	Low
810196	0.2	2,000	Low		810237	0.2	2,000	Low
810197	0.1	1,000	Low		810238	0.3	3,000	Low
810198	0.2	2,000	Low		810239	0.2	2,000	Low
810199	0.2	2,000	Low		810240	0.4	4,000	Low
810200	0.1	1,000	Low		810241	1.0	10,000	Low
810201	0.1	1,000	Low		810242	0.2	2,000	Low
810202	0.1	1,000	Low		810243	0.4	4,000	Low
810203	0.1	1,000	Low		810244	0.4	4,000	Low
810204	0.1	1,000	Low		810245	0.1	1,000	Low
810205	0.4	4,000	Low		810246	0.3	3,000	Low
810206	0.1	1,000	Low		810247	0.6	6,000	Low
810207	0.1	1,000	Low		810248	0.1	1,000	Low
810208	0.4	4,000	Low		**810249†**	0.2	2,000	Low
810210	0.2	2,000	Low		**810250†**	0.1	1,000	Low
810212	0.1	1,000	Low		**810251†**	0.1	1,000	Low
810213	0.5	5,000	Low		**810252†**	0.2	2,000	Low
810214	0.2	2,000	Low		810253	0.1	1,000	Low
810215	0.2	2,000	Low		**810254†**	**0.3**	**3,000**	**Low**
810216	0.3	3,000	Low		810255	0.1	1,000	Low
810217	0.2	2,000	Low		810256	0.2	2,000	Low
810218	0.1	1,000	Low		810257	0.1	1,000	Low
810219	0.5	5,000	Moderate		810257	0.1	1,000	Low
810220	0.6	6,000	Low		810258	0.4	4,000	Moderate
810221	0.3	3,000	Low		810259	0.7	7,000	Moderate
810222	0.4	4,000	Low		810260	0.2	2,000	Low
810225	0.3	3,000	Low		810261	0.5	5,000	Moderate
810226	0.2	2,000	Low		810262	1.1	11,000	Low
810227	0.1	1,000	Low		810263	0.2	2,000	Low

Road Number	Length (Miles)	Estimated Cost*	Priority		Road Number	Length (Miles)	Estimated Cost*	Priority
810264	0.2	2,000	Low		810309	0.2	2,000	Low
810265	1.3	13,000	Moderate		810310	0.2	2,000	Low
810266	0.1	1,000	Low		810311	0.2	2,000	Low
810267	0.6	6,000	Low		810313	0.1	1,000	Low
810271	0.2	2,000	Low		810314	0.1	1,000	Low
810272	0.1	1,000	Low		810315	0.7	7,000	Low
810273	0.1	1,000	Low		810316	0.3	3,000	Low
810274	0.4	4,000	Low		810317	0.3	3,000	Low
810275	0.5	5,000	Low		810318	0.4	4,000	Low
810276	0.2	2,000	Low		810319	0.1	1,000	Low
810278	0.2	2,000	Low		810321	0.2	2,000	Low
810279†	**0.3**	**3,000**	**Low**		810322	0.4	4,000	Low
810280	1.4	14,000	Moderate		810324	1.2	12,000	Low
810281	0.1	1,000	Low		810325	0.7	7,000	High
810282	0.1	1,000	Low		810326	0.3	3,000	Low
810283	0.6	6,000	Low		810327	0.1	1,000	Low
810284	0.8	8,000	Low		810328	0.1	1,000	Low
810285	0.7	7,000	Low		810329	0.1	1,000	Low
810286	0.8	8,000	Moderate		810330	0.2	2,000	Low
810287†	**1.5**	**15,000**	**Moderate**		810331^	0.3	1,500	Moderate
810289†	**0.3**	**3,000**	**Moderate**		810332^	0.7	3,500	High
810290	0.1	1,000	Low		810333	0.1	1,000	Low
810291†	**0.3**	**3,000**	**Low**		810334	0.1	1,000	Low
810292	0.1	1,000	Low		810336	0.3	3,000	Low
810293	2.1	21,000	High		810337	0.5	5,000	Low
810294	0.1	1,000	Low		810338	0.1	1,000	Low
810296	0.4	4,000	Moderate		810339	0.3	3,000	Low
810297	0.4	4,000	Low		810340	0.1	1,000	Low
810299	0.2	2,000	Low		810341	0.4	4,000	Low
810300	0.3	3,000	Low		810342	0.6	6,000	Low
810302	0.1	1,000	Low		810343	0.1	1,000	Low
810304	0.6	6,000	High		810344	0.1	1,000	Low
810305	0.2	2,000	Low		810345	0.6	6,000	Low
810306	0.5	5,000	High		810346	0.8	8,000	Low
810307	0.1	1,000	High		810347	0.2	2,000	Low
810308	0.2	2,000	Low		810348	0.5	5,000	Low
					810349	0.1	1,000	Low

Road Number	Length (Miles)	Cost	Priority
810350	0.3	3,000	Low
810351	0.3	3,000	Low
810352	0.4	4,000	Low
810353	0.1	1,000	Low
810354	0.4	4,000	Moderate
810355	0.6	6,000	Moderate
810356	0.1	1,000	Low
810357	0.2	2,000	Low
810358	1.4	14,000	Low
810359	0.2	2,000	Low
810365	0.2	2,000	Low
810366	0.2	2,000	Low
810367	0.1	1,000	Low
810368	0.5	5,000	Moderate
810369	0.3	3,000	Low
810370	0.2	2,000	Low
810372	0.3	3,000	Low
810373	0.1	1,000	Low
810374	0.1	1,000	Low
810375	0.3	3,000	Low
810376	0.1	1,000	Low
810377	0.1	1,000	Low
810378	0.1	1,000	Low
810380	0.6	6,000	Low
850019	0.1	1,000	Low
850031	0.1	1,000	Low
Total	**89**	**880,000**	

†- Roads marked with symbol will be used for the timber sale and then decommissioned after use
^- Some segmentsof these roads will be used for access to decommissioning and then placed-into long term storage (last 0.5 miles of Rd. 5251-B; first 0.2 miles of Rd. 810332 and 810315; Rds. 810331 and 810153;
*-Average Forest costs for road decommissioning are about $10,000 per mile.
**- Priorities are based on the following: High- known problems with failures, potential failures, or stream crossings; Moderate- road contains stream crossings but pose lower risk to aquatic habitats; Low- very few stream crossings with low risk to aquatic habitats

APPENDIX C

Best Management Practices (BMPs)

For The Lower Orogrande Project Area

Introduction

The Forest Service is required by law to comply with water quality standards developed under authority of the Clean Water Act. Both the Environmental Protection Agency and the State of Idaho are responsible for enforcement of these standards. The Clearwater Forest Plan states (Chapter II, p. 27) that the Forest will "apply State water quality standards and Best Management Practices to land-disturbing activities to ensure that State water quality standards are met or exceeded...projects that will not meet State water quality standards shall be redesigned, rescheduled, or dropped." The use of BMPs is also required in the Memorandum of Understanding between the Forest Service and the State of Idaho as part of our responsibility as the Designated Water Quality Management Agency on National Forest System lands.

Idaho water quality standards regulate non-point source pollution from timber management and road construction activities through application of Best Management Practices (BMPs). The BMPs were developed under authority of the Clean Water Act to ensure that Idaho waters do not contain pollutants in concentrations that adversely affect water quality or impair a designated use. State-recognized BMPs that will be used during project design and implementation are contained in these documents:

a. Rules and Regulations Pertaining to the Idaho Forest Practices Act, (IFPA), as adopted by the Idaho Land Board (April 2000); and

b. Rules and Regulations and Minimum Standards for Stream Channel Alterations, as adopted by the Idaho Water Resources Board under authority of the Idaho Stream Channel Protection Act (ISCPA).

Many of the rules and regulations for stream channel alterations are contained, in slightly different form, in a Memorandum of Understanding (MOU) between the Idaho Department of Water Resources and Forest Service Regions One and Four dated January 2008.

Executive Order 13112 relates to Invasive Species and prevents the introduction of invasive species and provides for their control. Each federal agency is to identify actions that may affect the status of invasive species and prevent the introduction of the invasive species. Regional direction (FSM2080) discusses prevention and control measures for various forest activities.

The Practices described herein are tiered to the practices in FSH 2509.22. They were developed as part of the NEPA process, with interdisciplinary involvement, and meet State and Forest water quality objectives. The purpose of this appendix document is to: 1) establish the connection between the Soil and Water Conservation Practices (SWCP) employed by the Forest Service and BMP's identified in Idaho Water Quality Standards (IDAHO APA 16.01.2300.05); and 2) identify how the SWCP, Standard Specifications for the Construction of Roads, Timber Sale Contract provisions and Stewardship Contract provisions meet or exceed the Rules and Regulations Pertaining to the Idaho Forest Practices Act, Title 38, Chapter 13, Idaho Code (BMP's). The relevant portions of the Rules and Regulations developed under the Idaho Stream Protection Act are also covered.

SOIL AND WATER CONSERVATION PRACTICES (BMPs)

***Soil and Water Conservation Practice (FSH 2509.22)**

11 WATERSHED MANAGEMENT

W11.05 Wetlands Analysis and Evaluation
W11.07 Oil and Hazardous Substance Spill Contingency Planning
W11.09 Management by Closure to Use
W11.11 Petroleum Storage and Deliver Facilities and Management

13 VEGETATION MANIPULATION

G13.02 Slope Limitations for Tractor Operation
G13.03 Tractor Operation Excluded from Wetlands, Bogs, and Wet Meadows
E13.04 Revegetation of Surface Disturbed Areas
E13.05 Soil Protection During and After Slash Windrowing
E13.06 Soil Moisture Limitations for Tractor Operation

14 TIMBER

A14.02 Timber Harvest Unit Design
A14.03 Use of Sale Area Maps for Designating Soil and Water Protection Needs
A14.05 Protection of Unstable Areas
A14.06 Riparian Area Designation
A14.07 Determining Tractor Loggable Ground
E14.08 Tractor Skidding Design
E14.09 Suspended Log Yarding in Timber Harvesting
A14.10 Log Landing Location and Design
E14.11 Log Landing Erosion Prevention and Control
E14.12 Erosion Prevention and Control Measures During Timber Sale Operations
E14.14 Revegetation of Areas Disturbed by Harvest Activities
E14.15 Erosion Control on Skid Trails
E14.16 Meadow Protection During Timber Harvesting
S14.17 Streamcourse Protection (Implementation and Enforcement)
E14.18 Erosion Control Structure Maintenance
A14.19 Acceptance of Timber Sale Erosion Control Measures Before Sale Closure
A14.22 Modification of the Timber Sale Contract

15 ROADS AND TRAILS

A15.02 General Guidelines for Road Location/Design
E15.03 Road and Trail Erosion Control
E15.04 Timing of Construction Activities
E15.05 Slope Stabilization and Prevention of Mass Failures
E15.06 Mitigation of Surface Erosion and Stabilization of Slopes
E15.07 Control of Permanent Road Drainage
E15.08 Pioneer Road Construction
E15.09 Timely Erosion Control Measures on Incomplete Road and Streamcrossing Projects
E15.10 Control of Road Construction Excavation & Sidecast Material
S15.11 Servicing and Refueling of Equipment

S15.12 Control of Construction In Riparian Areas
S15.13 Controlling In-Channel Excavation
S15.14 Diversion of Flows Around Construction Sites
S15.15 Stream Crossings on Temporary Roads
S15.19 Streambank Protection
E15.21 Maintenance of roads
E15.22 Road Surface Treatment to Prevent Loss of Materials
G15.24 Snow Removal Controls
E15.25 Obliteration of Temporary Roads

18 FUELS MANAGEMENT

E18.02 Formulation of Fire Prescriptions
E18.03 Protection of Soil and Water from Prescribed Burning Effects

***CLASSES OF SWCP (BMP)**

A = Administrative **G** = Ground Disturbance Reduction
E = Erosion Reduction **W** = Water Quality Protection
S = Stream Channel Protection/Stream Sediment Reduction

FORMAT OF THE BMPs

Each Soil and Water Conservation Practice (SWCP) is described as follows:

Title: Includes the sequential number of the SWCP and a brief title

Objective: Describes the SWCP objective(s) and the desired results for protecting water quality.

Compliance: Provides a qualitative assessment of how the implementation of the specific measures will meet Forest Practices Act Rules and Regulations pertaining to water quality.

Implementation: This section identifies: (1) the range of site-specific water quality protection measures to be implemented and (2) how the practices are expected to be applied.

Effectiveness: Provides a qualitative assessment of expected effectiveness that the applied measure will have on preventing or reducing impacts on water quality. The SWCP effectiveness rating is based on literature & research, administrative studies, and professional experience. The SWCP is rated either High, Moderate, or Low based on the following criteria:

a. Literature/Research

b. Administrative studies

For those SWCPs that have a corresponding Forest Practices Act Rule, information on effectiveness was generated from the Clearwater Forest BMP audits in 1999-2004. A rating of "high" was assigned where the measure(s) kept sediment from reaching the stream in 100percent of the sites checked. A rating of "moderate" was assigned where the measure(s) kept sediment from reaching the stream in 90 - 99percent of the sites checked. A rating of "low" was assigned where the measure(s) kept sediment from reaching the streams in less than 90percent of the sites checked.

c. Experience (judgment of an expert by education and/or experience)

d. Fact (obvious by logical response)

ITEMS COMMON TO ALL SOIL AND WATER CONSERVATION PRACTICES

Responsibility for Implementation: The District Ranger is responsible for insuring the factors identified in the following SWCPs are incorporated into: Timber Sale Contracts through the inclusion of proper B and/or C provisions; or Public Works Contracts through the inclusion of specific contract clauses.

The Contracting Officer, through his/her official representative (Sale administrator and/or Engineering Representatives for timber sale and stewardship contracts; and Contracting Officers Representative for public works contracts) is responsible for insuring that the provisions are properly administered on the ground.

Monitoring: Ten percent of all timber sales are monitored by the Forest Hydrologist on an annual basis for implementation and effectiveness of BMP's.

ABBREVIATIONS

TSC = Timber Sale Contract
TSA = Timber Sale Administrator
PWC = Public Works Contract
WQLS = Water Quality Limited Segment
RHCA= Riparian Habitat Conservation Area
SPS = Standard Project Specifications
FPA = Idaho Forest Practices Act
COR = Contracting Officer Representative
SAM = Sale Area Map
SC = Stewardship Contract

LOWER OROGRANDE BMPs

PRACTICE 11.05 - Wetlands Analysis and Evaluation
PRACTICE 13.03 - Tractor Operation Excluded from Wetlands, Bogs, and Wet Meadows
PRACTICE 14.16 - Meadow Protection During Timber Harvesting

OBJECTIVE: To maintain wetland functions and avoid adverse soil and water resource impacts associated with the destruction or modification of wetlands, bogs and wet meadows.

COMPLIANCE: FPA Rule - 030.08.c

IMPLEMENTATION: This is covered by the TSC Provision B6.61 (Meadow Protection) and SC G.6.1 and K-G.6.2#, which is a standard provision in all contracts. When it is necessary to identify these areas on the SAM, direction to do so and protective requirements will be incorporated into C6.62 (Wetlands Protection). Vehicular or skidding equipment shall not be used on meadows except where roads, landings, and tractor roads are approved. In all cases, soil and vegetation will be protected from disturbance which would cause adverse affects on water quality, quantity and aquatic habitat. Unless otherwise agreed, trees felled into meadows shall be removed by end-lining, and resulting logging slash shall also be removed. Damage to meadows, streamcourses, and Riparian Areas caused by unauthorized Purchaser's operations shall be repaired by the Purchaser in a timely manner to restore and prevent further damage. This project would utilize INFISH buffers, which require a 150 foot no-harvest buffer around the perimeter of wetlands greater than one acre in size and a 100 foot buffer around the perimeter of wetlands smaller than one acre in size.

EFFECTIVENESS: High

PRACTICE 11.07 - Oil and Hazardous Substance Spill Contingency Planning
PRACTICE 11.11 - Petroleum Storage and Delivery Facilities & Management
PRACTICE 15.11 - Servicing and Refueling of Equipment

OBJECTIVE: To prevent contamination of waters from accidental spills of fuels, lubricants, bitumens, raw sewage, wash water, and other harmful materials by prior planning and development of Spill Prevention Control and Countermeasure Plans.

COMPLIANCE: FPA Rule - 060.02.a, b, c and 060.04.a

IMPLEMENTATION: TSC provision B6.341 and SC G.3.4.1 hold the purchaser responsible for taking appropriate preventive measures to insure that any spill of oil or oil products does not enter any stream or other waters of the United States. Purchaser shall prepare a Spill Prevention Control and Countermeasures (SPCC) Plan for all sales. The plan will meet applicable EPA requirements as a minimum and shall include mitigation requirements concerning fuel storage, transfer and spill containment stated in the Biological Analysis or Evaluation for this project. The plan must be certified by a registered professional engineer.

The Contracting Officer Representative will designate the location, size and allowable uses of service and refueling areas. The criteria below will be followed at a minimum:

1. Petroleum product storage containers with capacities of more than 120 gallons, stationary or mobile, will be located no closer than 300 feet from stream, watercourse, or area of open water. Dikes, berms, or embankments will be constructed to contain the volume of petroleum products stored within the tanks. Diked areas will be sufficiently impervious and of adequate capacity to contain spilled petroleum products.

2. Transferring petroleum products: During fueling operations or petroleum product transfer to other containers, there shall be a person attending such operations at all times.

3. Equipment used for transportation or storage of petroleum products shall be maintained in a leakproof condition. If the Forest Service Representative determines there is evidence of petroleum product leakage or spillage he/she shall have the authority to suspend the further use of such equipment until the deficiency has been corrected.

4. Construction of an engineered containment structure (excavated sump and constructed berms) is required to house fuel storage containers. Storage containers will be at least 300 feet away from surface water. The containment area shall be designed to hold 125percent of the volume of the largest storage vessel in the containment area, or delivery vehicle.

In the event any leakage or spillage enters any stream, water course or area of open water, the operator will immediately (in TSC B6.342 or SC G.3.4.1) notify the COR who will be required to follow the actions to be taken in case of hazardous spill, as outlined in the Forest Hazardous Substance Spill Contingency Plan.

EFFECTIVENESS: Moderate. A plan insures foresight, but cannot eliminate the risk of materials being spilled and escaping into waters.

PRACTICE 11.09- Management by Closure to Use

OBJECTIVE: To exclude activities that could result in damages to facilities or degradation of soil and water resources.

COMPLIANCE: FPA Rule - None

IMPLEMENTATION: All temporary roads and short-term specified roads will be obliterated by recontouring following use.

EFFECTIVENESS: High

PRACTICE 11.13 - Sanitary Guidelines for Construction of Temporary Labor, Spike, Logging, and Fire Camps and Similar Installations

OBJECTIVE: To eliminate water pollution and other potential environmental and health impacts from the disposal of human waste and wastewater from temporary camps of all types.

COMPLIANCE: FPA Rule - None

IMPLEMENTATION: Latrines or pits for camps will be located at least 150 feet downstream from any camps, 100 feet from surface water, and 4 feet above high ground water. Latrines will be replaced with chemical toilets or similar units as soon as practical.

EFFECTIVENESS: Moderate

PRACTICE 13.02 - Slope Limitations for Tractor Operation

OBJECTIVE: To reduce gully & sheet erosion and associated sediment production by restricting tractor operation to slopes where corrective measures for proper drainage are easily installed and effective.

COMPLIANCE: FPA Rule - 030.03.a, b

IMPLEMENTATION: Tractor or wheel skidding shall not be conducted on sustained slopes exceeding 35 percent gradient. Cut-to-length operations, which operate on a bed of slash, would not be conducted on sustained slopes exceeding 45percent.

EFFECTIVENESS: High

PRACTICE 13.04 - Revegetation of Surface Disturbed Areas
PRACTICE 14.14 - Revegetation of Areas Disturbed by Harvest Activities

OBJECTIVE: To protect soil productivity and water quality by minimizing soil erosion.

COMPLIANCE: FPA Rules - 030.04.c and 030.05.a, b.

IMPLEMENTATION: All temporary roads in the sale area will be seeded after construction and after final use, as identified in TSC B6.6 and C6.601. Exposed soil on landings and skid trails will be seeded and fertilized after use. Seed mixes (specific to the district) and fertilizer specifications will be incorporated into TSC provision C6.601# or SC K-G.6.0.1#(Erosion Control Seeding). TSC provision C6.633# and SC K-G.6.3.3# (Temporary Road, Skid Trail/Skid Road and Landing) will identify that scarification/ripping of compacted landings, tractor skid roads in regeneration harvest units, and closed roads will be a minimum of 6 inches, not to exceed 2 feet.

Areas of new construction and exposed soil would be seeded and fertilized. If problem revegetation areas are discovered following construction then additional revegetation methods such as matting, top soil replacement or other effective processes would be employed through contract modifications.

EFFECTIVENESS: High

PRACTICE 13.05 - Soil Protection During and After Slash Windrowing
PRACTICE 14.18 - Erosion Control Structure Maintenance
PRACTICE 15.04 - Timing of Construction Activities
PRACTICE 15.08 - Pioneer Road Construction
PRACTICE 15.09 - Timely Erosion Control Measures on Incomplete Road and Stream-Crossing Projects

OBJECTIVE: To reduce erosion and sedimentation from road surfaces and fill slopes.

COMPLIANCE: FPA rules - 040.03. d, g; 030.05.a

IMPLEMENTATION:

1) On all new construction, pioneer work will be limited to a maximum total of 1500 feet after September 1

2) Temporary seeding and fertilizing will be required within 10 days when 2500 feet or the entire road (whichever is less) has been constructed to grade and slopes are completed. All new road construction will receive another seed and fertilizer application during the normal seeding season, September 1 through September 30

3) Unbroken slash filter windrows will be constructed through all draws and below culvert cross drains in contributing areas

4) Erosion control blankets will be used on fill slopes at large fills in contributing areas

5) Riprap will be placed in road ditch transitions.

6) TSC provision B6.6 and SC provision G.6.7 require that during the period of the contract, the Purchaser shall provide maintenance of soil erosion control structures constructed by the Purchaser until they become stabilized, but not for more than one year after their construction. After 1 year, any erosion control work needed is accomplished through KV funding earmarked for that use. TSC provision C6.601 and SC G.6.6 require the Purchaser to maintain erosion control structures concurrently with his operations under the sale and in any case not later than 15 days after completion of skidding each unit or subdivision.

7) When conditions permit operations outside the normal operating season, erosion control measures must be kept current with ground disturbance, to the extent that the affected area can be rapidly "closed," if weather conditions deteriorate. Areas must not be abandoned for the winter with remedial measures incomplete.

EFFECTIVENESS: High

PRACTICE 13.06 - Soil Moisture Limitations for Tractor Operation

OBJECTIVE: To minimize soil compaction, puddling, rutting, and gullying with resultant sediment production and loss of soil productivity.

COMPLIANCE: FPA Rule - 030.03.a, b.

IMPLEMENTATION: Following TSC provision B6.6, equipment shall not be operated when ground conditions are such that excessive damage will result.

EFFECTIVENESS: Moderate. The measure will be highly effective in preventing impacts under sustained adverse weather, but may not catch sudden downpours which have short-term impacts on water quality.

PRACTICE 14.02 - Timber Harvest Unit Design
PRACTICE 14.08 - Tractor Skidding Design
PRACTICE 14.10 - Log Landing Location and Design

OBJECTIVE: To insure that timber harvest unit design will secure favorable conditions of water flow, maintain water quality and soil productivity by locating/designing landings and skidding patterns to best fit the terrain and avoid soil erosion.

COMPLIANCE: FPA Rules - 030.03.a, b, c, d; 030.04.a, b

IMPLEMENTATION: TSC provision B6.311 (Plan of Operation) should specify how Purchaser intends to meet erosion control requirements.

TSC provision B6.422 (Landings and Skid Trails) and SC provisions G.4.2 and K-G.4# requires that the location of all skid trails and landings must be agreed upon before construction. Specific items that will be addressed during sale-layout and pre-work with the operator will include the following:

Skid Roads (for tractors) and Forwarder Roads:

a) Design and locate skid roads, forwarder roads, and skidding operations to minimize soil disturbance.

b) Locate skid roads and forwarder roads to avoid concentrating runoff and provide breaks in grade and waterbars.

c) Locate skid roads and forwarder roads and landings away from natural drainage systems, and divert runoff to stable areas.

Landings: Landings, log decks, and burn piles will not be located within RHCAs.

EFFECTIVENESS: High

PRACTICE 14.03 - Use of Sale Area Maps for Designating Soil & Water Protection Needs

OBJECTIVE: To delineate the location of protection areas and special treatment areas, to insure their recognition, proper consideration, and protection on the ground.

COMPLIANCE: No related FPA rule.

IMPLEMENTATION: The following features will be designated on the SAM:

1) The streams listed below will be designated as Streamcourse Protection areas to be protected under the TSC.

Copper, Elk, Cache, Shake, Grande, Hook, Pine, Fuzzy, Fir and Tamarack Creeks and their tributaries within the project area.

2) Wetlands and Riparian Areas (meadows, lakes, pot holes, etc.) will also be identified and protected under the TSC

3) These features will be reviewed on the ground by the Purchaser and the Sale Administrator prior to harvesting. A Watershed Specialist (Forest or District) will ensure that the above features have been designated on the Sale Area Map during contract development. This will be coordinated with the District Timber Management Staff.

EFFECTIVENESS: High. Identifying the locations of water and wetlands prior to activity is paramount in preventing impacts to water quality.

PRACTICE 14.05 - Protection of Unstable Areas
PRACTICE 15.05 - Slope Stabilization and Prevention of Mass Failures

OBJECTIVE: To identify and protect unstable areas and avoid triggering mass movements of the soil mantle and resultant erosion and sedimentation.

COMPLIANCE: FPA Rule – 030.03.a,b and 030.04.c

IMPLEMENTATION:

1) Avoid road locations or timber harvesting on or adjacent to active landslides, slump blocks and other mass wasting processes.

2) To prevent landslides, fill material used in landing construction shall be free of loose stumps and excessive accumulations of slash. On slopes where sidecasting is necessary, landings shall be stabilized by use of seeding, compaction, riprapping, benching, mulching, or other suitable means.

3) If road construction is necessitated in an area of moderate instability, the embankment should be layer placed or as recommended by a geotechnical engineer.

4) On unstable landtypes with sideslopes of 50 percent to 60 percent gradient, at least 40 percent crown closure will be maintained. On sideslopes 60 percent or greater, at least 50 percent crown closure will be maintained. Maintaining the residual canopy closure within the treated stands on unstable landtypes will minimize the risk of mass wasting by providing rooting strength/cohesion, buttressing and soil arching action, and reducing piezometric levels (saturated subsurface zone) in the slope.

EFFECTIVENESS: Avoidance is the most effective measure on high-risk landforms. Risk assessment based on experience is essential. Effectiveness is expected to be moderate.

PRACTICE 14.06 - Riparian Area Designation and Protection
PRACTICE 15.12 - Control of Construction in Riparian Areas

OBJECTIVE: To minimize the adverse effects on Riparian Areas with prescriptions that manage nearby logging and related land disturbance activities.

COMPLIANCE: FPA Rules - 030.07.b, c, d, e.i, e.ii, e.iii, e.iv, e.v, e.vi, e.vii, e.viii and 030.06.a, b, c

IMPLEMENTATION: Streamcourses will be identified on the Sale Area Map. All streams will have INFISH buffers. The following RHCA buffers will be applied:

1) Intermittent streams will have a 100 foot buffer.

2) Perennial non-fish bearing streams will have a 150 foot buffer.

3) Perennial fish bearing streams will have a 300 foot buffer.

4) Wetlands under one acre will have a 100 foot buffer. Wetlands 1 acre and larger will require a 150 foot buffer.

Where existing roads are located in the RHCA and a forwarder or skid trail traverses a portion of the RHCA located above the road in order to access the road: 1) trail locations shall be agreed upon in advance of use; 2) such trails shall be limited to the minimum amount necessary; 3) ground disturbance will be minimized through use of slash mats and; 4) straw bales and/or filter cloth will be placed in road ditch transitions to prevent sediment delivery to streams.

EFFECTIVENESS: Moderate (030.07.b, c, d, e.i, e.iii, e.iv, e.v, e.vi, e.vii, e.viii and 030.06.a, b, c = 100percent, 030.07.e.ii = 67percent)

PRACTICE 14.07 - Determining Tractor Loggable Ground
PRACTICE 14.08 - Tractor Skidding Design

OBJECTIVE: To minimize erosion and sedimentation and protect soil productivity by designing skidding patterns to best fit the terrain.

COMPLIANCE: FPA Rules - 030.03.a, b, c, d; 030.04.a, b

IMPLEMENTATION:

1) Use of constructed skid roads and forwarder roads will be avoided.

2) The location of tractor skid roads and forwarder roads shall be approved by the Sale Administrator.

3) Tractor piling operations shall not be allowed on sustained slopes over 35 percent.

EFFECTIVENESS: High

PRACTICE 14.09 - Suspended Log Yarding in Timber Harvesting

OBJECTIVE: To protect the soil from excessive disturbance and accelerated erosion and to maintain the integrity of the Riparian Area and other sensitive watershed areas.

COMPLIANCE: FPA Rules - 030.03.d and 030.07.d

IMPLEMENTATION: Skyline yarding (partial or full suspension) will be used on all areas identified for such logging on the Sale Area Map. As noted in TSC provision B1.1, item (n), areas requiring special yarding, as identified in TSC provision B6.42 (Skidding and Yarding) and SC G.4.2, will be identified on the Sale Area Map. These requirements will be included in TSC C6.4 and SC K-G.4#(Conduct of Logging).

EFFECTIVENESS: High

PRACTICE 14.11 - <u>Log Landing Erosion Prevention and Control</u>
PRACTICE 14.12 - <u>Erosion Prevention and Control Measures During Timber Sale-Operations</u>
PRACTICE 14.15 - <u>Erosion Control on Skid Trails</u>

OBJECTIVE: To protect water quality by minimizing erosion and subsequent sedimentation derived from log landings and skid trails.

COMPLIANCE: FPA Rules - 030.05.a, b and 030.04.c

IMPLEMENTATION: The following criteria will be used in controlling erosion and restoring landings and skid trails so as to minimize erosion:

<u>General</u>:

1) TSC provision B6.6 and SC provision G.6 require the purchaser to conduct operations in a reasonable fashion to minimize erosion. This is a standard provision in the TSC and SC. Additionally, specific erosion requirements will be spelled out in TSC Provisions such as B6.422, B6.64, C6.601 and SC Provisions such as G.6.4, K-G.6, K-G.6.3.2#, K-G.6.6.1and K-G.6.3.3#.

2) Skid trails, forwarder trails, and landings will be seeded as necessary with a mix specified in C6.601 or K-G.6.6.1.

<u>Landings:</u>

1) Landings will be located outside of RHCAs -except in cut-to-length units where the existing road access is currently located within an RHCA.

2) During construction, landings will have design filter windrows constructed at the toe of the fill slope to mitigate sediment delivery to the streams until timber harvesting begins.

3) During period of use, landings will be maintained in such a manner that debris and sediment are not delivered to any streams.

4) Landings will drain in a direction and manner that will minimize erosion and will preclude sediment delivery to any stream.

5) Standard TSC provision B6.64 (Landings) or SC Provision G.4.2.2 require that after landings have served the Purchaser's purpose, the Purchaser shall ditch or slope them to permit the water to drain or spread.

<u>Skid trails and Forwarder Trails</u>:

1) Stabilize skid trails, forwarder trails, and fire trails whenever they are subject to erosion, by water-barring, cross draining, outsloping and spreading slash on the trails to reduce erosion. This work shall be kept current to prevent erosion prior to fall and spring runoff.

2) If skid trails are compacted, after use, they will be ripped (in regeneration harvest units).

3) Skid trails and forwarder trails will be planted with trees concurrently with unit planting to revegetate the disturbed area (in regeneration harvest units).

EFFECTIVENESS: High

PRACTICE 14.16 - Meadow Protection During Timber Harvesting

OBJECTIVES: To avoid damage to the ground cover, soil, and water in meadows.

COMPLIANCE: 030.08.c

IMPLEMENTATION: Vehicular or skidding equipment shall not be used on meadows except where roads, landings, and tractor roads are approved. In all cases, soil and vegetation will be protected from disturbance which would cause adverse affects on water quality, quantity and aquatic habitat. The TSC provision B6.61 (Meadow Protection) or SC provision G.6.1is a standard provision in all contracts.

> Unless otherwise agreed, trees felled into meadows shall be removed by end-lining, and resulting logging slash shall also be removed. Damage to meadows, streamcourses, and riparian areas caused by unauthorized Purchaser's operations shall be repaired by the Purchaser in a timely manner to restore and prevent further damage.

EFFECTIVENESS: High

PRACTICE 14.17 - Stream Channel Protection (Implementation and Enforcement)
PRACTICE 15.19 - Streambank Protection

OBJECTIVE: To protect stream beds and streamside vegetation, during and after forest practice operations and road construction, by (1) maintaining unobstructed passage of stormflows; and (2) reducing sediment and other pollutants from entering streams.

COMPLIANCE: FPA Rules - 030.06.a, b, c; 030.07.b, c, d, e.i, e.ii

IMPLEMENTATION: To reduce sediment and channel bank degradation at sites disturbed by construction of stream crossing or roadway fill, it may be necessary to incorporate "armoring" in the design of a structure to allow the water course to stabilize after construction. Riprap, gabion structures, and other measures are commonly used to armor stream banks and drainage ways from the erosive forces of flowing water. These measures must be sized and installed in such a way that they effectively resist erosive water velocities. Stone used for riprap should be free from weakly structured rock, soil, organic material and materials of insufficient size, all of which are not resistant to stream flow and would only serve as sediment sources. Outlets for drainage facilities in erodible soils commonly require rip-rapping for energy dissipation (FSH 7709.56B, and Std. FS Spec. 619).

The intent of the regulations and clauses is to protect the integrity of stream channels, and minimize adverse impacts to the channel and downstream resources and beneficial uses. To list all of the regulations that would be implemented to protect and restrict channel alterations, would require a small book. The following items, however, highlight some of the principal provisions incorporated into the TSC that will govern channel protection in the sale area.

1) Care shall be taken to cause only the minimum necessary disturbance to the natural appearance of the area. Streambank vegetation shall be protected except where its removal is absolutely necessary for completion of the work [TSC Provisions B6.5, B6.6 and C6.4# or SC provision G.5 and G.6].

a) All streambanks will be avoided by design.

b) Logs shall be fully suspended when skyline yarding across a stream.

2) If the channel is damaged during construction, it will be restored as nearly as possible to its original configuration without causing additional damage to the channel.

3) Purchaser shall repair all damage to a streamcourse if the Purchaser is negligent in their operations, including damage to banks and channel, to an acceptable condition as agreed to by the certified Sale Administrator and Purchaser's representative.

4) All project debris shall be removed from streamcourse, in an agreed manner that will cause the least disturbance. (TSC B6.5 or SC G.5 Streamcourse Protection). Specifically:

a) Whenever possible trees shall be felled, bucked, and limbed in such a manner that the tree or any part thereof will fall away from any Class I streams. Slash that enters Class I streams as a result of harvesting operations shall be continuously removed, as will other debris that enters Class I streams whenever there is a potential for stream blockage or if the stream has the ability for transporting such debris. Material removed shall be placed five feet slope distance above the ordinary high water mark.

i) Material to be removed will be all logging debris that is less than six inches in diameter and less than six feet long.

b) Slash and other debris that enters Class II streams whenever there is a potential for stream blockage or if the stream has the ability for transporting the debris shall be removed immediately following skidding and placed above the ordinary high water mark.

i) Material to be removed will be all logging debris that is less than six inches in diameter and less than six feet long.

5. Fill-transition rip-rapping at stream crossings.

6. Slash filter windrows will be placed in draws and contributing areas of perennial streams.

EFFECTIVENESS: Moderate (030.06.a, b, c = 100percent, 030.07.b, c, d, e.i = 100percent, 030.07.e.ii = 67percent)

PRACTICE 14.19 - Acceptance of Timber Sale Erosion Control Measures Before Sale Closure

OBJECTIVE: To assure the adequacy of required erosion control work on timber sales.

COMPLIANCE: No directly related FPA rule.

IMPLEMENTATION AND RESPONSIBILITY: TSC provision B6.36 and SC provision G.3.6 require that upon the Purchaser's written request and assurance that work has been completed the Forest Service shall perform an inspection. One area the Purchaser might request acceptance for are specific requirements such as logging, slash disposal, erosion control, or snag felling. In evaluating acceptance the following definition will be used by the Forest Service: "Acceptable" erosion control means only minor deviation from established standards, provided no major or lasting impact is caused to soil and water resources. Certified TSAs will not accept as complete erosion control, measures which fail to meet this criteria.

EFFECTIVENESS: High - because correction of erosion control measures can be affected immediately after the evaluation.

PRACTICE 14.22 - <u>Modification of the Timber Sale Contract</u>

OBJECTIVE: To modify the Timber Sale Contract if new circumstances or conditions indicate that the timber sale will cause irreversible damage to soil, water, or watershed values.

COMPLIANCE: No directly related FPA rule.

IMPLEMENTATION: Over time, the Forest Service adopts new policies and direction that amend how we address timber harvest operations. An example is the change in direction to leave some large organic debris in stream channels instead of removing it all. In cases such as this, modifications to the TSC would occur under provision B2.37 (Minor Changes) or SC i.3.3.

If evidence indicates that unacceptable impacts would occur to soil and water resources if the sale was harvested as planned, the Forest Service Representative will request the Contracting Officer to gain Regional Forester advice and approval to proceed with a resource environmental modification, mutual cancellation, or unilateral cancellation of the Timber Sale Contract as allowed by TSC Provision B8.3 or SC i.3.3. If the decision is for a resource environmental modification, once the action is approved by the Regional Forester, the appropriate Line Officer will assign an interdisciplinary team to make recommendations of implementation.

EFFECTIVENESS: Low to moderate. Interrupting a sale to update practices assumes impacts have already occurred to some extent.

PRACTICE 15.02 - <u>General Guidelines for the Location and Design of Roads and Trails</u>

OBJECTIVE: To locate and design roads and trails with minimal soil and water resource impact while considering all design criteria.

COMPLIANCE: No related FPA Rule.

IMPLEMENTATION:

1) Reconstruction and construction of roads will have a scheduled plan reviewed prior to contract administration so that appropriate modifications can be made before the contract package is completed.

2) Roads will be located high on the slope to minimize sediment delivery to streams.

3) New road construction will not cross any perennial streams.

EFFECTIVENESS: Moderate. A plan insures foresight, but excellent administration is still required to be highly effective.

PRACTICE 15.03 - <u>Road and Trail Erosion Control Plan</u>

OBJECTIVE: To prevent, limit, and mitigate erosion, sedimentation, and resulting water quality degradation prior to the initiation of construction and maintenance activities through effective contract administration during construction and timely implementation of erosion control practices.

COMPLIANCE: FPA – 040.04.a,b, c.

IMPLEMENTATION: Prior to the start of construction, the Contractor shall submit a schedule for proposed erosion control work as required in the Standard Specifications. The schedule shall include all erosion control items identified in the specifications. Erosion control work to be done by the Contractor will be defined in Standard - Special Project Specification 204 and/or in the Drawings.

The schedule shall consider erosion control work necessary for all phases of the project. The Contractor's construction schedule and plan of operation will be reviewed in conjunction with the erosion control plan by the TSA, district watershed specialist and engineering to insure their compatibility before any schedules are approved.

EFFECTIVENESS: Moderate. A plan insures foresight, but excellent administration is still required to be highly effective.

PRACTICE 15.06 - Mitigation of Surface Erosion and Stabilization of Slopes

OBJECTIVE: To minimize soil erosion from road cutslopes, fillslopes, and travelway.

COMPLIANCE: FPA Rule - 040.03.c and 040.04.a, b, and c

IMPLEMENTATION: Areas requiring mitigation of surface erosion will occur during the life of the timber sale contract. When these are found, the following provisions will be implemented.

1) Where surface erosion is occurring because of inadequate vegetative cover, additional seeding and re-fertilization will occur using recommended seed and fertilizer mixes. Timber Sale Contract provision C6.601 and SC provision K-G.6.0.1# cover re-seeding of cut slopes if bared by the purchaser's maintenance operation. If the purchaser has done his required seeding, or bare spots are not caused by the purchaser, revise the KV Plan to cover costs.

2) Where ditches are carrying erosion products into stream channels, straw bale and erosion cloth ditch blocks will be installed to "short-circuit" the delivery. Seeding of the eroding surfaces, and seeding of the stored sediment in the ditch will also be accomplished. If problem areas are known before contract award, add C5.31# or K-F.3.1.4# to require cross ditching on segments of road.

3) Particular attention will be given to areas where straw bale/erosion cloth structures either fail or the opportunity for success is doubtful. Additional relief drainage may be installed to drain the ditches out onto suitable ground, to at least preclude delivery of erosion products to the stream. Other solutions may involve replacing ditch blocks, adding riprap and eliminating source of sediment. If problem areas are known before contract award, add C5.31# or K=F.3.1.4# to require cross ditching on segments of road.

4) Slumping of cutslopes will require a combination of both mechanical and vegetative controls. If/when this problem is found, a solution will be determined in consultation with Engineers and the Soil Scientist.

If surface erosion problem areas were unknown before the sale was awarded or are part of a recurrent slide area, corrective measures will be beyond the scope of Purchaser's responsibility. Repair and/or improvement will be handled under modification in the contract under C8.3 or through a KV Plan Revision.

EFFECTIVENESS: Low (040.03.c = 100percent, 040.04.b = 67percent)

PRACTICE 15.07 - Control of Permanent Road Drainage

OBJECTIVE: To minimize the erosive effects of concentrated water and the degradation of water quality by proper design and construction of road drainage systems and drainage control structures.

COMPLIANCE: FPA Rule – 040.03.a and 040.04.c.i, c.ii, c.iii.

IMPLEMENTATION: The following items will be included in the timber sale contract provisions or road contract special project specifications.

1) Drainage ways shall be cleared of all debris generated during construction and/or maintenance which potentially interferes with drainage or water quality, TSC C5.31, SC K-F.3.1# and Standard Road Specifications

2) Install sediment basins in ditches.

3) Road portions over 6percent grade will be insloped, under 6percent will be outsloped.

4) During and following operations on out-sloped roads, out-slope drainage shall be retained and berms shall be removed on the outside edge except those intentionally constructed for protection of road grade fills (TSC C5.31 or SC K-F.3.1#).

5) Cross drains and relief culverts shall be constructed to minimize erosion of embankments. The time between road construction and installation of erosion control devices shall be minimized. Drainage structures or cross drains shall be installed on uncompleted roads which are subject to erosion prior to fall or spring runoff. Relief culverts shall be installed with a minimum grade of 1 percent (Standard Road Specifications).

6) Relief culverts and rolling dips will be provided at frequent intervals, based upon soil erodibility and road grade.

EFFECTIVENESS: High (040.03.hi, hii, h.iii = 100percent; 040.04.c.i, c.ii, c.iii, c.iv = 100percent)

PRACTICE 15.10 - <u>Control of Road Construction Excavation and Sidecast Material</u>

OBJECTIVE: To reduce sedimentation from unconsolidated, excavated, and sidecast material caused by road construction, reconstruction or maintenance.

COMPLIANCE: FPA Rule - 040.03.d

IMPLEMENTATION: Normal erosion control such as seeding should be supplemented with special mitigation measures where exposed material (excavation, embankment, borrow pits, waste piles, etc.) is potentially erodible, and where sediment would enter streams. Jute netting, filter cloth, mulching slash windrows, sediment ponds, and hay bale dams will be used when such measures are determined necessary for local conditions.

EFFECTIVENESS: High (040.03.d = 100percent)

PRACTICE 15.13 - <u>Controlling In-Channel Excavation</u>

OBJECTIVE: To minimize downstream sedimentation by insuring that all in-channel excavations are carefully planned.

COMPLIANCE: SCA Rule 9,1(a) - Meets

IMPLEMENTATION: Location and method of stream crossings will be designed and agreed to prior to construction. The following items highlight some of the principal provisions incorporated into the TSC and SC that will govern channel protection:

1) Construction equipment may cross, operate in, or operate near streamcourses only where so agreed to and designated by the Forest Service prior to construction (TSC B6.5 or SC G.5).

Crossing of perennial stream channels will be done in compliance with the specifications in the Stream Channel Alteration Act Rules and Regulations and included in the project specifications.

2) No construction equipment shall be operated below the existing water surface except that fording the stream at one location only will be permitted, and work below the water level that is necessary for culvert bedding or footing installations will be permitted to the extent that it does not create unnecessary turbidity or stream channel disturbance [SCA Rule 9,1(a) and Standard Road Specifications-Special Project Specification 204.04].

3) Wheeled or track laying equipment shall not be permitted to operate within 5 feet slope distance of the apparent high water mark of Class II streams and 75 feet of Class I streams. (C6.6 Erosion Prevention and Control or G.5).

4) Construction of any hydraulic structures in stream channels will be in compliance with the Rules and Regulations pertaining to the Stream Channel Protection Act, Title 42, Chapter 38, Idaho Code).

EFFECTIVENESS: High

PRACTICE 15.14 - <u>Diversion of Flows Around Construction Sites</u>

See also Practice 15.13

OBJECTIVE: To restore the natural course of any stream as soon as practical if the stream is diverted as a result of timber management activities.

COMPLIANCE: SCA Rule - Meets

IMPLEMENTATION: Flow in stream courses may only be diverted if the Forest Service deems it necessary for the contractor to do the job. Such a diverted flow shall be restored to the natural stream course as soon as practicable and in any event, within the period stated in Stream Channel Alteration Act Rules and Regulations. Stream channels impacted by construction activity will be restored to their natural grade, condition, and alignment. (Std. FS Spec. 206,206A).

1) On perennial Class I and II streams dewatering shall be accomplished prior to excavation for culvert installation.

2) Filter cloth, erosion control blankets, plastic, straw bales, and rip-rap can be used to keep live water from contacting new fill during culvert installations.

3) When dewatering of stream crossings is required, a non-erodible conduit, flex pipe or geotextile fabric will be used. Diversion dams above the crossing shall be hand constructed. Sediment traps shall be constructed below the stream crossing.

EFFECTIVENESS: High

PRACTICE 15.15 - **<u>Stream Crossings on Temporary Roads</u>**

See also Practice 15.13

OBJECTIVE: To keep temporary roads from unduly damaging streams, disturbing channels, or obstructing fish passage.

COMPLIANCE: 030.07.b.

IMPLEMENTATION: Temporary roads will be located high on the slope to minimize sediment delivery to any streams. New temporary road construction will not cross any perennial or intermittent streams.

EFFECTIVENESS: High. Stream crossings will be avoided.

PRACTICE 15.21 - Maintenance of Roads

OBJECTIVE: To conduct regular preventive maintenance operations to avoid deterioration of the roadway surface and minimize disturbance and damage to water quality, and fish habitat.

COMPLIANCE: FPA Rule - 040.04.a, b, c.i, c.ii, c.iii, c.iv, d.i, d.ii, e.i, e.ii, e.iii, fi, fii, fiii.

IMPLEMENTATION: For roads in active timber sale areas standard TSC provision B5.3 (Road Maintenance) or SC provision F.3 requires the Purchaser to perform or pay for road maintenance work commensurate with the Purchaser's use. Purchaser's maintenance responsibility shall cover the before, during, and after operation period during any year when operations and road use are performed under the terms of the timber sale contract (C5.31 - Road Maintenance) or Stewardship Contract (K-F.3.1#). Purchaser shall perform road maintenance work, commensurate with purchaser's use, on roads controlled by Forest Service and used by purchaser in connection with this sale except for those roads and/or maintenance activities which are identified for required deposits in C4.219. All maintenance work shall be done concurrently, as necessary, in accordance with T-specifications set forth herein or attached hereto, except for agreed adjustments (TSC C5.31 or SC K-F.3.1#).

1) Sidecast all debris or slide material associated with road maintenance in a manner to prevent their entry into streams (TSC C5.31, SC K-F.3.1# and Standard Road Specification-Special Project Specification T108).

2) Repair and stabilize slumps, slides, and other erosion features causing stream sedimentation (TSC C5.31, SC K-F.3.1# and Special Project Specification T108).

3) Active Roads. An active road is a forest road being used for hauling forest products, rock and other road-building materials. The following maintenance shall be conducted on such roads.

a) Culverts and ditches shall be kept functional.

b) During and upon completion of seasonal operations, the road surface shall be crowned, out-sloped, in-sloped or cross ditched, and berms removed from the outside edge except those intentionally constructed for protection of fills.

c) The road surface shall be maintained as necessary to minimize erosion of the subgrade and to provide proper drainage.

d) If road oil or other surface stabilizing materials are used, apply them in such a manner as to prevent their entry into streams (TSC C5.314 and C6.341, SC K-F.3.1#).

4) Inactive Roads. An inactive road is a forest road no longer used for commercial hauling but maintained for access (e.g., for fire control, forest management activities, recreational use, and occasional or incidental use for minor forest products harvesting). The following maintenance shall be conducted on inactive roads.

a) Following termination of active use, ditches and culverts shall be cleared and the road surface shall be crowned, out-sloped or in-sloped, cross ditched or otherwise left in a condition to minimize erosion. Drainage structures will be maintained thereafter as needed.

b) The roads may be permanently or seasonally blocked to vehicular traffic.

c) Roads will be seeded and fertilized.

5) Abandoned Roads. An abandoned road is not intended to be used again. No subsequent maintenance of an abandoned road is required after the following procedures are completed:

a) The road is left in a condition suitable to control erosion by out-sloping, cross ditched, seeding, or other suitable methods.

b) Ditches are cleaned.

c) The road is blocked to vehicular traffic.

d) The department may require the removal of bridges and culverts except where the owner elects to maintain the drainage structures as needed.

6) For roads not in an active timber sale area road maintenance must still occur at sufficient frequency to protect the investment in the road as well prevent deterioration of the drainage structure function. This will be accomplished by scheduling periodic inspection and maintenance, including cleaning dips and cross drains, repairing ditches, marking culvert inlets to aid in location, and cleaning debris from ditches and culvert inlets to provide full function during peak runoff events (FSH 7709.15).

EFFECTIVENESS: High (040.04.a = 94percent; 040.04.b, c.i, c.ii, c.iii, c.iv, d.i, d.ii = 100percent).

PRACTICE 15.22 - Road Surface Treatment to Prevent Loss of Materials

OBJECTIVE: To minimize the erosion of road surface materials and consequently reduce the likelihood of sediment production.

COMPLIANCE: No associated FPA Rule.

IMPLEMENTATION: On timber sale roads, the Purchaser shall undertake measures to prevent excessive loss of road material if the need for such action has been identified. Road surface treatments may include: watering, applying magnesium chloride, sealing, aggregate surfacing, chip-sealing, or paving.

EFFECTIVENESS: Moderate. Stabilization of road surface and ditch lines over 6 percent with competent rock (rock that does not rapidly disintegrate) is often over 90 percent effective (Burroughs, et.al., 1983a, 1983b, 1984, 1985; Burroughs and King, 1989).

PRACTICE 15.24 - Snow Removal Controls

OBJECTIVE: To minimize the impact of snow melt on road surfaces and embankments and to reduce the probability of sediment production resulting from snow removal operations.

COMPLIANCE: FPA Rule - 040.05.a,b.

IMPLEMENTATION:

1) During snow removal operations, banks shall not be undercut, nor shall gravel or other selected surfacing material be bladed off the roadway surface. Ditches and culverts shall be kept functional

during and following roadway use. If the road surface is damaged, the Purchaser shall replace lost surface material with similar quality material and repair structures damaged in blading operations.

TC5.316# or SC K-F.3.1.6#.

2) Snow berms shall not be left on the road surface or shall be placed to avoid channelization or concentration of melt water on the road or erosive slopes. Berms left on the shoulder of the road shall be removed and/or drainage holes opened at the end of winter operations and before spring breakup. Drainage holes shall be spaced as required to obtain satisfactory surface drainage without discharge on erodible fills. On insloped roads, drainage holes shall also be provided on the ditch side, but care taken to ensure that culverts and culvert inlets are not damaged.

EFFECTIVENESS: Moderate

PRACTICE 15.25 - <u>Obliteration of Temporary Roads</u>

OBJECTIVE: To reduce sediment generated from temporary roads by obliterating them at the completion of their intended use.

COMPLIANCE: FPA Rule - 040.04.di, dii.

IMPLEMENTATION: Effective obliteration is generally achieved through a combination of the following measures: (TSC B6.63, C6.601#, C6.632# and SC G.6.3, and K-F.6.3.2#).

1) Road effectively drained and blocked.

2) Temporary culverts and bridges removed and any modified channel slopes stabilized and revegetated.

3) Road returned to resource production through revegetation (native species, or trees).

4) Sideslopes reshaped and stabilized.

EFFECTIVENESS: High

PRACTICE 18.02 - <u>Formulation of Fire Prescriptions</u>

OBJECTIVE: To provide for soil and water resource protection while achieving the management objective through the use of prescribed fire.

COMPLIANCE: No Related FPA Rule.

IMPLEMENTATION: The prescription elements are defined by the interdisciplinary team during the environmental analysis. Field investigations are conducted to identify site specific conditions which may affect the prescription. Both the optimum and tolerable limits for soil and water resource needs should be established. Prescription elements will include such factors as fire weather, slope aspect, soil moisture and fuel moisture which influence the fire intensity. These elements have a direct effect on whether or not a litter layer remains after burning and whether or not a water repellent layer is formed. The amount of remaining litter significantly affects erosion rates, water quality and runoff volumes.

EFFECTIVENESS: Moderate. A plan insures foresight, but excellent implementation is still required for high effectiveness.

PRACTICE 18.03 - <u>Protection of Soil and Water from Prescribed Burning</u>

OBJECTIVE: To maintain soil productivity, minimize erosion, and prevent ash, sediment, nutrients, and debris form entering surface water.

COMPLIANCE: No Related FPA Rule.

IMPLEMENTATION: Forest Service and/or other crews are used to prepare the units for burning. This includes cross ditching firelines and reducing fuel concentrations. The interdisciplinary team identifies Riparian Areas and soils with water repellant tendencies as part of the environmental analysis. Some of the techniques used to prevent soil erosion and water quality degradation are: (1) construct water bars in fire lines; (2) reduce fuel loadings in drainage channels; (3) maintain the integrity of the Riparian Area; (4) avoid intense fires, which may promote water repellency, nutrient leaching, and erosion; (5) retain or plan for sufficient ground cover to prevent erosion of the burned sites and (6) removal of all debris added to stream channels as a result of prescribed burning, unless debris is prescribed to improve fisheries habitat.

EFFECTIVENESS: High

NOXIOUS WEED PREVENTION MEASURES (FSM 2080)

MEASURE 1.a. <u>Remove the seed source</u>

OBJECTIVE: To remove the seed source that could be picked up by passing vehicles and limit seed transport in new and reconstruction areas.

IMPLEMENTATION: Remove all mud, dirt and plant parts from al off road equipment before moving into project areas. TSC C6.351# requires washing of machinery to be used in the project area.

MEASURE 1.a.3 <u>Re-establish vegetation</u>

OBJECTIVE: Re-establish vegetation on bare ground due to construction and reconstruction activity to minimize weed spread.

IMPLEMENTATION: Revegetate all disturbed soil, except the travel way on surfaced roads, in a manner that optimizes plant establishment for that specific site. Use native material where appropriate and available. Use a seed mix that includes fast, early season species to provide quick, dense revegetation. Use local seeding guidelines. TSC C6.601 specifies seed mix and application rates.

MEASURE 1.a.4. <u>Minimize the movement of … weed species</u>

OBJECTIVE: Minimize the movement of existing and new weed species caused by moving infested gravel and fill material. TSC C6.351# requires washing of machinery to be used in the project area.

MEASURE 6.1. Timber

OBJECTIVE: Ensure that weed prevention is considered in all pre-harvest timber projects.

IMPLEMENTATION: Remove all mud, dirt and plant parts from all off road equipment before moving into project area. TSC C6.351# requires washing of machinery to be used in the project area.

MEASURE 6.2. Minimize creation of sites suitable for weed establishment.

IMPLEMENTATION: Revegetate bare soil in a manner that optimizes plant establishment for that specific site. Use native material where appropriate and available. Use a seed mix that includes fast, early season species to provide quick, dense revegetation. Use local seeding guidelines.

The following chart displays the Soil and Water Conservation Practice (Best Management Practice or BMP) required in the Forest Service Handbook 2509.22, along with each unit, and alternative that would be affected by the BMP. The chart also references the timber sale contract provision that would respond to the required BMP, and the Forest Practices Act (IFPA) rule that each BMP satisfies. Note that not all the BMP's are listed here--only the ones that require further specificity in the EIS are listed. The Forest Service requires adherence to all practices outlined in the handbook. And for those pertaining to timber harvesting, there are standard provisions for compliance in every timber sale contract (refer to FSM 2509.22 and Timber Sale Contract Provisions available in any Ranger District Office).

Best Management Practices Applicable to Lower Orogrande Proposal

BMP #	BMP Title	Unit Numbers	Effectiveness	Alternative	Contract Provision	IFPA Rule
11	**WATERSHED MANAGEMENT**					
11.05	Wetlands Analysis and Evaluation	Sale Area	High	All	B6.61, B6.62, B6.5	030.08.c
11.07	Oil and Hazardous Substance Spill Contingency Planning	Sale Area	Moderate	All	B6.341, B6.342	060.02.a, b, c and 060.04.a
11.09	Management by Closure to Use	Units , 1, 2, 3, 4, 5, 6, 7, 11, 14, 16, 19, 27	High	All	B5.4, C5.41#	
11.11	Petroleum Storage and Delivery Facilities and Management	Sale Area	Moderate	All	B6.341	060.02.a, b, c and 060.04.a
11.13	Sanitary Guidelines for Construction of Temporary Labor, Spike, Logging, Fire Camps and Similar Installations	Sale Area	Moderate	All	B6.34	None
13	**VEGETATION MANIPULATION**					
13.02	Slope Limitations for Tractor Operation	Units 1, 2, 4-11, 13-16, 18, 27, and 29	High	All	B6.6, C6.4#	030.03.a, b
13.03	Tractor Operation Excluded from Wetlands, Bogs, and Wet Meadows	Units 1, 2, 4-11, 13-16, 18, 27, and 29	High	All	B6.61, B6.62	030.08.c
13.04	Revegetation of Surface Disturbed Areas	All units	High	All	B6.6, C6.601	030.04.c; 030.05.a, b
13.05	Soil Protection During and After Slash Windrowing	All new construction	High	All	B6.6, Std. F.S. Spec. 201	040.03. d, g
13.06	Soil Moisture Limitations for Tractor Operation	Units 1, 2, 4-11, 13-16, 18, 27, and 29	Moderate	All	B6.31, B6.6	030.03.a,b
14	**TIMBER**					
14.02	Timber Harvest Unit Design	All units	High	All	Sale layout	None
14.03	Use of Sale Area Maps for Designating Soil and Water Protection Needs	All units	High	All	B1.1, B6.5	None
14.06	Riparian Area Designation	All units	Moderate	All	B1.1, B6.422, B6.5, C6.4# Sale layout	010.59.a,b,c,d; 030.07.b, c, d, e.i, e.ii, e.iii, e.iv, e.v, e.vi, e.vii, e.viii and 030.06.a, b, c
14.07	Determining Tractor Loggable Ground	Units 1, 2, 4-11, 13-16, 18, 27, and 29	High	All	Sale layout, C6.4	030.03.a, b, c, d;
14.08	Tractor Skidding Design	Units 1, 2, 4-11, 13-16, 18, 27, and 29	High	All	B6.422, C6.4#	030.03.a, b, c, d; 030.04.a, b
14.09	Suspended Log Yarding in Timber Harvesting	Units 2-7, 10-25, and 27-29 .	High	All	B6.42, C6.4	030.03.d; 030.07.d

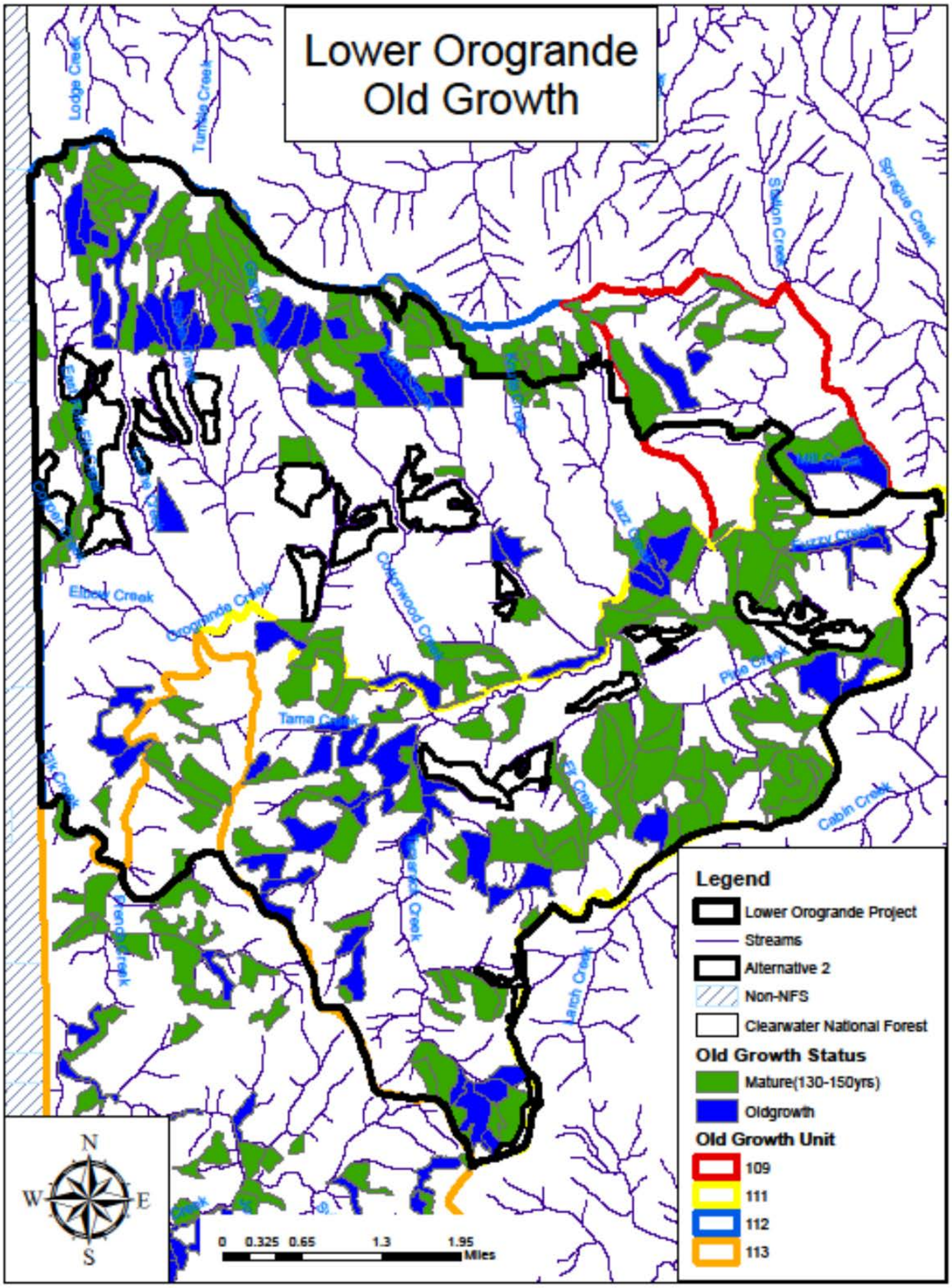
BMP #	BMP Title	Unit Numbers	Effectiveness	Alternative	Contract Provision	IFPA Rule
14.10	Log Landing Location and Design	All units	High	All	B6.422	030.04.a, b, c
14.11	Log Landing Erosion Prevention and Control	All units	High	All	B6.422, B6.64, C6.601	030.05.b; 030.04.c
14.12	Erosion Prevention and Control Measures During Timber Sale Operations	All units	High	All	B6.31, B6.6, C6.601	030.05.a, b; 030.04.c
14.14	Revegetation of Areas Disturbed by Harvest Activities	All units	High	All	C6.601, C6.633	030.04.c; 030.05.a, b
14.15	Erosion Control on Skid Trails	All units	High	All	B6.422, B6.6, B6.66, C6.601, C6.632#	030.05.a
14.16	Meadow Protection During Timber Harvesting	All units	High	All	B6.61	030.08.c
14.17	Stream Channel Protection Implementation and Enforcement	All units	Moderate	All	B6.5, B6.6, C6.4#, Std. Spec. 619	030.06.a, b, c; 030.07.b, c, d. e.i, e.ii
14.18	Erosion Control Structure Maintenance	All units	High	All	B4.218, B6.6, B6.64, B6.65, B6.66, B6.67	030.05.a
14.19	Acceptance of Timber Sale Erosion Control Measures Before Sale Closure	All units	High	All	B6.36, B6.1, B6.6, B6.64, B6.65	None
14.22	Modification of the Timber Sale Contract	Sale Area	Low to Moderate	All	B8.3	None
15	**ROADS AND TRAILS**					
15.02	General Guidelines for Road Location/Design	All road reconstruction and temporary road construction	Moderate	All	None	None
15.03	Road and Trail Erosion Control Plan	All road reconstruction	Moderate	All	B5.2, B6.312, B6.6, C5.31, Spec 204	040.04.a,b, c
15.04	Timing of Construction Activities	All units and all road reconstruction	High	All	A1.6, B6.31, B6.6, B6.66	
15.06	Mitigation of Surface Erosion and Stabilization of Slopes	All units and culvert replacements	Low	All	B5.2, B5.3, C5.31, C5.419#, C6.6, C6.601	040.03.c; 040.04.a,b,c
15.07	Control of Permanent Road Drainage	All road reconstruction and roads maintained under the TSC.	High	All	B6.6, B6.67, C5.31, C6.6, SPS 204	040.03.a ; 040.04.c.i, c.ii, c.iii
15.08	Pioneer Road Construction	All road reconstruction	High	All	B6.6	
15.09	Timely Erosion Control Measures on Incomplete Road and Streamcrossing Projects	All road reconstruction	High	All	SPS 204, B6.6, B6.66	
15.10	Control of Construction Excavation and Sidecast Material	All road reconstruction and culvert replacement	High	All	C5.31, C5.419#, C6.601, C6.6, Std. Spec. 203	040.03.d; 040.04.a
15.11	Servicing and Refueling of Equipment	Sale Area	Moderate	All	B6.34	060.02.a, b, c and 060.04.a

BMP #	BMP Title	Unit Numbers	Effectiveness	Alternative	Contract Provision	IFPA Rule
15.12	Control of Construction in Riparian Areas	All units	Moderate	All	B6.5, C6.62	030.07.b, c, d, e.i, e.ii, e.iii, e.iv, e.v, e.vi, e.vii, e.viii and 030.06.a, b, c
15.13	Controlling In-Channel Excavation	All road reconstruction and culvert replacement	High	All	B6.5, Std. and Special Spec. 204	SCA Rule 9,1(a)
15.14	Diversion of Flows Around Construction Sites	All road reconstruction and culvert replacement	High	All	B6.5, Std. Spec. 206 & 206A	SCA Rule
15.15	Streamcrossings of Temporary Roads	All temporary roads	High	All	B6.5, B6.62, B6.63, C6.632	030.07.b
15.19	Streambank Protection	All units	Moderate	All	Std. Spec 619, B6.5	
15.21	Maintenance of Roads	All roads maintained under the TSC	High	All	B5.3,C5.31, C5.312, C5.314, C5.316#	040.04.a, b, c.i, c.ii, c.iii, c.iv, d.i, d.ii, e.i, e.ii, e.iii, fi, fii, fiii.
15.22	Road Surface Treatment to Prevent Loss of Materials	All roads maintained under the TSC	Moderate	All	C5.314, C5.41	
15.24	Snow Removal Controls	All units	Moderate	All	C5.316#	040.05.a,b
15.25	Obliteration of Temporary Roads	All short-term temporary roads	High	All	B6.63, C6.632#, C6.601#, C6.633#	040.04.d.i, ii
18	**FUELS MANAGEMENT**					
18.02	Formulation of Fire Prescriptions	All units	Moderate	All	None	None
18.03	Protection of Soil and Water from Prescribed Burning Effects	All units	High	All	B6.6, B6.7, C6.7	None

APPENDIX D

Old Growth Forest Habitat Summary

Old Growth Unit	Stand Type	Acres	% of OGAU
OGAU 109 (1,964 acres)	Old Growth	157	8%
	Mature Forests (130-150 years)	422	21%
	Total	**579**	**29%**
OGAU 111 (9,183 acres)	Old Growth	1034	11%
	Mature Forests (130-150 years)	2641	29%
	Total	**3675**	**40%**
OGAU 112 (11,511 acres)	Old Growth	1004	9%
	Mature Forests (130-150 years)	2284	20%
	Total	**3288**	**29%**
OGAU 113 (8,141 acres)	Old Growth	534	7%
	Mature Forests (130-150 years)	1249	15%
	Total	**1783**	**22%**


Lower Orogrande
Old Growth
Legend
Lower Orogrande Project
Streams
Alternative 2
Non-NFS
Clearwater National Forest
Old Growth Status
Mature(130-150yrs)
Oldgrowth
Old Growth Unit
109
111
112
113
0 0.325 0.65 1.3 1.95
Miles
N
S
E
W
Lodge Creek
Tumble Creek
Sprague Creek
Stallion Creek
Elbow Creek
Orogrande Creek
Cottonwood Creek
Jazz Creek
Fuzzy Creek
Pine Creek
Tama Creek
Elk Creek
Cabin Creek
Larch Creek
French Creek
Mill Creek

APPENDIX E

Summary of Detrimental Soil Disturbance (DSD)

Table E-1: Detrimental Soil Disturbance (DSD) in Proposed Treatment Units (Design Measures not required).

Unit	Alts.	Unit Acres	Previous Treatment and year	Proposed Treatment Type	Proposed Treatment Method	Percent of Unit With Existing DSD From Previous Activities (%)	Estimated Percent increase in DSD from Proposed Harvest Activities and Temp. Rd Construction[2] (%)	Cumulative Percent DSD Following Proposed Harvest Activities and Temp. Rd. Construction (%)
1	2, 3	47	Regen-1960s	Regen	ground-based (64%)/skyline (36%)	4.8	7.1	11.9
2	2, 3	115	Regen-1960s	Regen	ground-based (74%)/skyline (26%)	4.1	8.4 [a]	12.5
3	2	14	Regen-1960s	Regen	skyline	0.0	8.1 [b]	8.1
3	3	14	Regen-1960s	Regen	skyline	0.0	2.0	2.0
4	2, 3	25	Regen-1960s	Regen	ground-based (60%)/skyline (40%)	0.0	6.8	6.8
6	2	40	Regen-1960s	Regen	skyline (90%)/ground-based (10%)	6.3	2.8	9.1
6	3	23	Regen-1960s	Regen	skyline (82%)/ground-based (18%)	10.3	3.4	13.7
8	2, 3	12	None known	Regen	ground-based	3.3	10.0	13.3
7	2	17	Regen-1960s	CT	skyline	7.7	2.0	9.7
9	2, 3	39	None known	Regen	ground-based	2.2	11.1 [c]	13.3
11	2, 3	75	Regen-1960s	CT	ground-based (84%)/skyline (16%)	3.3	8.7	12.0
12	2, 3	10	Regen-1960s	CT	skyline (90%)/ground-based (10%)	3.0	2.8	5.8
14	2	54	Regen-1960s	CT	skyline (93%)/ground-based (7%)	3.3	6.9[d]	10.2
15	2, 3	32	Regen-1960s	Regen	skyline (84%)/ground-based (16%)	3.3	3.3	6.6
16	2	96	Regen-1960s	Regen	ground-based (48%)/skyline (52%)	3.8	5.8	9.6

Unit	Alts.	Unit Acres	Previous Treatment and year	Proposed Treatment Type	Proposed Treatment Method	Percent of Unit With Existing DSD From Previous Activities (%)	Estimated Percent increase in DSD from Proposed Harvest Activities and Temp. Rd Construction[2] (%)	Cumulative Percent DSD Following Proposed Harvest Activities and Temp. Rd. Construction (%)
16	3	61	Regen-1960s	Regen	ground-based (75%)/skyline (25%) skyline	3.8	8.0	11.8
17	2, 3	16	Regen-1960s	CT	skyline	6.6	2.0	8.0
18	2, 3	9	Regen-1960s	Regen	skyline	3.3	2.0	5.3
19	2, 3	25	Inter.- 1960s	Regen	skyline	10.0	2.0	12.0
20	2, 3	55	Inter.-1980s	Regen	skyline (87%)/ground-based (13%)	0.0	3.0	3.0
21	2, 3	34	Inter.- 1960s	Regen	skyline	1.0	2.0	3.0
22	2, 3	44	Inter.- 1960s	CT	skyline	5.0	2.0	7.0
23	2, 3	35	Inter.-1980s	CT	skyline	1.0	2.0	3.0
24	2, 3	55	Regen-1960s	CT	skyline	6.0	2.0	8.0
25	2, 3	78	Regen-1960s	CT	skyline (90%)/ground-based (10%)	9.9	2.8	12.7
27	2	20	None Known	Regen	skyline (50%)/ground-based (50%)	3.3	6.0	9.9
27	3	10	None Known	Regen	ground-based	2.7	10	12.7
28	2, 3	13	None Known	Regen	ground-based (62%)/skyline (38%)	2.7	7.0	9.7
29	2, 3	36	None Known	Regen	ground-based	0.0	10.0	10.0
27	2	20	None Known	Regen	skyline (50%)/ground-based (50%)	3.3	6.0	9.9

[1]Regen = regeneration harvest; Inter = intermediate harvest ;CT = commercial thin harvest
[2]New DSD based on Forest monitoring results for harvest activities; incorporates the acreage treated by ground-based and/or skyline methods.
New DSD from temporary road construction assumes 3 acres of disturbance for each mile of temporary road at a 25 foot disturbed width. Potential new DSD from proposed forwarder trails is also included in these calculations.
[a] Includes .55 acres (0.18 mi.) in temporary road construction and/or forwarder trail disturbance in unit.
[b] Includes .85 acres (0.28 mi.) in temporary road construction and/or forwarder trail disturbance in or adjacent to unit.
[c] Includes 0.43 acres (0.14 mi.) in temporary road construction and/or forwarder trail disturbance in or adjacent to unit.
[d] Includes 2.33 acres (0.78 mi.) in temporary road construction in or adjacent to unit.

Table E-2: Detrimental Soil Disturbance (DSD) in Proposed Treatment Units Requiring Specific Design Measures.

Unit	Alts.	Unit Acres	Previous Treatment and year[1]	Proposed Treatment Type[1]	Proposed Treatment Method (% of unit)	Percent of Unit With Existing DSD From Previous Activities (%)	Estimated Percent increase in DSD from Proposed Harvest Activities and Temp. Rd Construction[2] (%)	Cumulative Percent DSD Following Proposed Harvest Activities and Temp. Rd. Construction (%)
5	2, 3	43	Regen-1960s	CT	ground-based (88%)/skyline (12%)	6.4	7.9 (maximum 3.4 acres of new DSD)	<15.0
10	2, 3	52	Regen-1960s	Regen	ground-based	10.0	4.8 (maximum 2.5 acres of new DSD)	<15.0
13	2, 3	72	Regen-1960s	CT	skyline (60%)/ground-based (40%)	9.1	5.0 (maximum 3.6 acres of new DSD)	<15.0

[1]Regen = regeneration harvest; Inter = intermediate harvest ;CT = commercial thin harvest

[2]New % DSD, and equivalent acreage shown, is the maximum allowable new disturbance in the unit. Design features in these units would require a layout plan to reuse existing disturbed areas (existing skid trails, non-system roads, landings) wherever possible, while avoiding sensitive areas (riparian areas; unstable, wet, or thin soils). New detrimental soil disturbance from harvest and temp. rd. activities would be limited to the maximum acreage of new DSD allowed as shown in this column. Portions of the unit would be dropped if the layout plan cannot access the entire unit while staying under the 15 percent standard. All skid trails and landings used would be decommissioned after use.